RAILROAD GAZETTE

SATURDAY, JULY 15, 1871.

The Objects of the New Jersey Lease.

One of the proprietors of the Jersey City *Evening Journal* has recently had an inverview with H. J. Lombaert, Esq., one of the Vice-Presidents of the Pennsylvania Central Railroad, and drew from him some of the plans which that company has in view in case the lease of the Joint Companies is effected, which are reported as follows:

At the outset of the interview, Mr. Lombaert remarked that "it is bad policy to say how you will cook your "fish until you have caught it, and as we have not "effected the lease yet, and do not know that we shall "do so, it is impossible for us to say what we shall do "in Jersey City. The lease and all the negotiations for "its completion are in the hands of the majority of the "di ectors of the Joint Companies. We are not under-"taking to push it or recommend to the stockholders of "the Joint Companies in the least. That is to be done "by the parties interested, who gave us to understand "that the assent of parties repre-enting the required "number of shares would be attained by the 10th of this "month, which has not yet been done."

In reply to a remark that the opponents of the lease had urged as an argument against effecting it, that the Pennsylvania Railroad Company, as a foreign corporation, would have no interest in developing the resources of the State, Mr. Lombaert said that the argument was so absurd as to be really no argument at all. As a corporation they were a railroad company, and got their money by affording facilities and accommodations for the public trade and travel, and looked for increased compensation by a judicious increase of the accommodations offered. The through b siness of any railroad was but a small percentage of its transactions, and for them to expect to pay the ten per cent. dividends guaranteed to the United Railroad and Canal companies on their entire stock out of the "through" traffic alone would be suicidal.

The Pennsylvania Railroad Company only consented to undertake the lease because other arrangements which they would have preferred to make could not be effected. Since the short line known as the Mantua Junction had been completed and in running order, there had been a continual blockade of cars at that point, because the United Companies had not sufficient facilities for unloading them at Jersey City. The Pennsylvania Company was compelled to get rid of the blockade at Mantua Junction or they could not ship their freight in the order in which it was consigned to them; the failure to ship it in order causing them, directly, great confusion, trouble and lo-s, and indirectly, a still more serious loss, owing to the diversion of freight for New York to other lines.

We are pledged under the lease to spend $4,0 0,000, and are prepared to spend $3,00 ,000 as soon as advisable. It is probable that our first expenditures in Jersey City will extend merely to the the construction of such temporary works that, being completed immediately, will at once relieve the blockade along the rest of our line. This expenditure will, of course, be thrown away, since we shall certainly replace the temporary structures as soon as possible.

Mr. Ashbel Welch, the President of the United Companies, in his report, states that plans have been matured for the improvement of Harsimus Cove, providing, I believe, for the erection of wharves and large warehouses there; also the construction of an elevated line through Jersey City, by means of which freight could be delivered at the second story of the warehouses, and thence easily dumped into the vessels beneath. It is possible that these plans may be somewhat modified, but I have no doubt they will be substantially carried out. We shall have to economize space in the best manner we can.

Mr. Lombaert said they should, in time, substitute iron bridges for all the wooden ones along the line, and should probably construct a short branch road from New Brunswick, to say Woodbridge or some near point that would enable them to bring the traffic from the southern part of the State direct to New York, and concentrate their business at Jersey City. It can be done cheaper and more advantageously at one place than if diffused over several.

In reply to a question if he thought Jersey City should be made a port of entry, he said:

The public interest demands it. Why should the heavy raw materials of commerce have additional burdens imposed upon them by being unloaded at Jersey City, and then transported by water or through the crowded streets of New York to Atlantic dock, Brooklyn, there to be again unloaded, stored and finally reshipped? Why should not all this business be done at Jersey City, where all the great railroads of the continent will discharge their freight? If the warehouses and facilities are built there, why should not all the heavy business be done there?

But, said the reporter, the Secretary of the Treasury, under New York inspiration, has uniformly refused so far to recognize bonded warehouses on the New Jersey side of the river.

Well, Secretaries of the Treasury can sometimes be compelled to do things they don't like.

But Congress has also refused to pass any law compelling the Secretary to do this. At least, though the House has passed the necessary bill to establish Jersey City as a port of entry, the New York influence in the Senate has always been strong enough to defeat it.

Yes; but it is quite possible that we may find friends enough in the West to pass such a bill, even through the Senate, if required.

May I inquire if your company has any intention of striking hands with the proposed National Line, if the lease is not effected?

That I cannot say at present. It is certain that as affairs now stand there must be an additional line from the South to New York. In addition, however, to the fact that we are already connected with the roads of the Joint Companies, we prefer their line to the National, because notwithstanding we have to shoulder the ten per cent. dividend for their lines in South Jersey, that cannot possibly earn it, it passes through the best country, that in which the towns are already located, while the National does not; besides which the Joint Companies can give us a bet'er water front at Jersey City than the other. Still I cannot say what we should do. We are now building a new line to Washington from Baltimore, which we are extending south into Virginia, and we must have a better outlet than we have at present to New York. Our freighters demand it.

Of course, if we get the roads of the Joint Companies our aim will be to do the business coming from the West and South to New York at such moderate rates, and to afford such facilities to travel, that there shall be no chance for a competing road like the National to live, and no necessity for it. It is no use attempting to make a profit in railroading by high rates. That course only builds up an opposition. The true plan is to make a profit by doing a large business at moderate rates, and look for increasing dividends in increased business resulting from the development of the country through which your line runs. That has been our policy hitherto, and would be in case we get possession of the roads of the United Companies under the lease.

With reference to the question of contesting the lease in the courts, Mr. Lombaert said: "Its opponents will be very foolish if they don't contest it, if there is the least doubt of its validity. We wish them to do it. In the case of the Philadelphia & Erie road leased by us, we would not spend a dollar under it until it had been before the Supreme Court and decided valid. We should want the same certainty in this case.

The New York, West Shore & Chicago Railroad.

We have received a copy of the report made to the directors of the New York, West Shore & Chicago Railroad Company by General Charles B. Stuart, Engineer-in-Chief of the enterprise. The design of this company is to open a new line between New York and Chicago, by a new road hence to Buffalo, connecting there, through the International Bridge now in process of construction, with the Great Western and Grand Trunk railways in Canada, and through them, and more especially through the Great Western, with the Michigan Central.

Between New York and Buffalo the distance of the proposed line will be 420 miles, or twenty-four miles less than the distance by the Hudson River and New York Central. From this city to Catskill the road will follow the west shore of the Hudson River keeping close to the water's edge. Upon this part of the line the maximum grade will not exceed ten feet per mile, while the curves will all be large enough to allow the highest rate of speed. Unlike the Hudson River Railroad, there will be no reverse curves, and no tunnels, nor any embankments of magnitude.

At Catskill the road will leave the Hudson River, and proceed in almost a direct line to the Mohawk, at Schenectady. Thence the route will lie along the south side of the Mohawk and Erie Canal to Utica; from that place to Syracuse the course will will be almost directly west. On this part of the line the grades going west will nowhere exceed thirty feet to the mile, and going east they will nowhere exceed twenty feet to the mile; while on the same part of its line the Central Railroad has grades of eighty feet to the mile. From Syracuse to Buffalo the line will be almost straight, leaving Rochester considerably to the north.

It appears that this company have become owners of the franchise of th West Shore Railroad, chartered some time since by the Legislature of New Jersey. This gives the company control of a frontage of 22 mil-s in extent, "along the buld-head line of New York harbor, "of the deepest and best protected water for wharves "on the bay." For the whole length of the palisades the river has an average depth of 45 feet at low water. The value of this vast extent of water front can scarcely be over-estimated. Ships of any size can be laid alongside the warehouses of the company, and can take in their freight with a facility not enjoyed elsewhere to the same extent. This water front can also be improved for use at comparatively little expense. Between the palisades and the river the bank varies in width from 200 to 1,200 feet, and wharves and storehouses can be erected there without the necessity of expensive stone excavations.

General Stuart argues in his r-port that there will be little competition between the West Shore Division of this line and the Hudson River Railroad. On the east side of the Hudson River there are already three or four railroads running parallel to each other, and all prosperous; while on the west side there is yet not a single one. At the same time the most populous and busy towns and cities are on the west side, and he is confident that these towns will at once furnish a very large local traffic.

General Stuart proposes a double track of railroad of four feet eight and a half inches gauge, with cuts and embankments twenty-four feet wide at grade, the bridges to be of wrought iron, the rails of steel weighing sixty pounds per yard, with ties of white oak, and ballast of broken stone. The total cost of the 420 miles he estimates at $25,213,500, or a little over $62,000 a mile. This estimate, however, does not include the cost of station houses or rolling stock.

This road will be, in every respect, more substantial than either the New York Central or the Hudson River, and it will be perfectly practicable to run passenger trains upon it with ordinary safety at a speed of fifty miles an hour. With its shorter line and more direct communication with Chicago through Canada and the Michigan Central, this road must necessarily become a favorite for through traffic. General Stuart estimates that the gross income will be over twenty-three millions a year, and the net income over nine millions, giving 18½ per cent. profit on a capital of fifty millions.

We learn that the gentlemen engaged in this enterprise have already substantially completed arrangements in England by which the money necessary for the construction of the road from this city to Buffalo is to be procured at 7 per cent. per annum, and that Mr. John M. Courtney, accompanied by the Hon. William M. Evarts, counsel for the company, leave for London to-day to consummate the negotiations. The work, we are assured, is to begin at once, the right of way in most of the counties of this State having been freely given to the company without any other compensation than the benefits expected from the construction of the road.—*New York Sun.*

The St. Louis Bridge.

The following report of the Chief Engineer, Capt. James B. Eads, made under date of May 20, 1871, will serve to supplement the report of last October, lately published in these columns:

I have the honor to report that the four principal foundations of your bridge are all now based upon the rock, and three of them—the two channel piers and west abutment—have been finished up to the skewback courses, and are now delayed in their further construction for the want of the cast-steel anchor-bolts which are required to secure the skewbacks to the masonry. The west abutment and east pier have been thus delayed since the 7th of March.

The air-chamber under the east abutment, the last one of the four foundations for the bridge, has been carefully filled. The two side-shafts are also filled up solid to the top of the pier, and the main shaft, the last remaining cavity in the work, has been concreted up to within seventy feet of the top of the pier. When the remainder of this shaft shall have been closed up, which will be accomplished by the last of this week, this abutment will form one solid mass from the bed rock, 117 feet high. It is now about twelve feet above water. The laying of masonry on this abutment will not be resumed until a frame-work similar to that at the west abutment shall have been erected, by which the pier and approach on that side of the river will be finished.

It has been my intention to remove the frame work and machinery on this bank to the other when the west approach over the levee shall have been completed, but the delay caused in its completion by the want of the steel anch-r bolts for more than two months past, may make it necessary to incur the expense of duplicating this frame-work and hoisting machinery. I am still, however, in hopes that we can complete the masonry of the west abutment and approach in time to use the same appliances at the eastern end of the bridge.

Excavations have been made beyond the east abutment for putting in the foundations of the towers and approach-piers Nos. 4 and 5. The latter one and the towers will rest on piles driven below the present level of the river's surface. A large portion of these piles are now driven. Pier No. 4 will be sunk by the pneumatic process to the level of extreme low water, nearly 20 feet below the present stage of the river. This system will be used for approach piers Nos. 1, 2, 3 and 4, as being most economic and rapid. The caissons will be almost wholly of timber and will be sunk below the low water level. One of these small caissons, No. 4, is now being put together on the site of the pier and the others are being made ready.

In filling the caisson under the east abutment, beds of concrete about 7 feet wide were placed carefully under the main girders of the cai son on the bed rock, and a similar bed of concrete 3½ feet wide was placed on the rock and under the entire circumference or edge of the caisson, thus giving a substantial and solid foundation for the timber bearings of the caisson. The entire area of the air chamber was then filled with sand as suggested in my report of Oct., 1870. This sand was put in through the various pipes used for air, smoke, water and sand pumps during the sinking of the pier; the air being first let out, and water admitted into the chamber until it and the pipes were all filled. From time to time, as the filling with sand progressed, the air pressure was again put on and the water expelled, the chamber visited and the sand leveled off and arranged as was deemed necessary, and the filling again resumed. I feel confident in assuring you that this work has been most admirably executed under the immediate supervision of the superintendent of construction, Mr. McComas, and that it is fully as substantial and durable as if filled with concrete in the manner used at the two channel piers. The filling of the air-chamber was daily inspected by Mr. Wieser, chief inspector of masonry, when the air pressure was on it, and I also visited it myself on several occasions. The saving in cost in using the sand, Mr. McComas and myself estimate to be fully $7,500. In addition to this saving may be added the gratification of having been able to dispense with the necessity of using a large number of men in an operation necessarily dangerous, notwithstanding the greatest precautions which ingenuity, science and care can institute.

In this connection I am glad to be able to report that no one has been permanently or seriously injured by working in this air-chamber, excepting one man who died from congestion of the lungs, resulting, as Dr. Jaminet and Mr. McComas inform me, from the most inexcusable disobedience of rules instituted for the safety of the men and which he had promised to observe.

During the last month ending May 1st, 2,263 cubic yards of masonry has been laid, the greater portion being on the west abutment. 65,222.5 cubic yards have been la d on the entire work from its commencement to the present time.

We have now on hand sufficient granite from the eastern quarries to continue the work on all four of the piers, and I think we will not be delayed by the non arrival of the remainder needed. 2,055 cubic yards are still needed to finish all of the piers.

Nearly all of the houses in the line of the west approach have been taken down, and the rubbish is being rapidly cleared away to enable us to begin the erection of the masonry for this approach. Contracts have been closed for the bricks needed, and one for the entire masonry in both approaches is now under consideration, and will probably be closed to-morrow.

A visit to the works of the Keystone Bridge Company, last

month, and to Mr. Butcher's steel works, enables me to state that there is no reason to doubt the ability of these two establishments, contractors and sub-contractors, for the superstructure to complete the erection of that part of the work undertaken by them, by the 15th day of next May. The delay in the steel work I think is mainly due to causes generally incident to the erection of important and expensive machinery. The preparation for doing the work at Pittsburgh impressed me quite favorably, as well as that at the steel works.

Recent advices from Philadelphia inform me that ten steel anchor bolts are partially completed, one of which is nearly ready to test; all are promised within a brief period; twelve iron anchor bolts for the upper skew backs have been wrought and tested, and are being finished at Pittsburgh; twenty steel staves for the tubes have also been rolled at the steel works.

The Suit to Prevent the Lease of the New Jersey Railroads.

The papers submitted to Chancellor Zabriskie, of New Jersey, in the prayer for an injunction prohibiting the carrying into effect of the proposed lease of the stocks of the United Railroad Companies of New Jersey to the Pennsylvania Railroad, cover the entire history of the railroads of New Jersey for forty years; they contain matter of great interest and importance, and are exceedingly voluminous. The documents were drawn up by Mr. Abraham Browning, of Camden, in the interest of John Black and other stockholders, most of whom are residents of the lower portion of the State. The stockholders whose names occur in the bill are twenty-one in number. The amount of stock owned by them varies from 500 to 815 shares, aggregating 8,765 shares, representing $376,500 of the capital stock of the companies. This is about one-fiftieth of the entire stock, and as it is held mostly by members of the Delaware & Raritan Railroad Company, and the Camden & Amboy Railroad Company, may be said to represent one-sixteenth of the stock of each of these organizations. Accompanying the bill are affidavits from each of the plaintiffs, setting forth, in each case, the particular claims of the parties, all of them being quite similar in their character.

The bill cites thirty-one acts of the Legislature affecting the rights and privileges of the companies and their stockholders, passed between February 3, 1831, and March 17, 1870. On these are based some of the objections, the principle ones, however, resting on the injustice which the lease will cause to the stockholders objecting on the alleged unconstitutionality and the act authorizing the lease, and on the impracticability and injustice of transferring to a foreign corporation powers and privileges which rightly belong to the citizens of the State. The capital stock is stated at $18,990,667.50. Upon this amount, throughout a term of thirty-eight years, the average dividends to stockholders have been twelve and one-fifth per cent. per annum. Their property, which cost $35,000,000, is valued at $50,000,000. This, together with the unexampled position of the works of the companies between the two largest cities in the United States, they claim, leads them to expect that during the next period of 38 years the dividends will increase rather than diminish, and will at least average 15 per cent. a year on the entire stock, free from tax. Instead of this 15 per cent., they claim that the lease would do them the injustice of allowing only 10 per cent., thus defrauding them of a rightful income, and depreciating the value of their stock. Stock giving an income of 12 per cent., with probable increase, must be more valuable than that having even a fixed income of only 10. The act of March, 1870, provides for such consolidation with companies, in or out of the State, as shall be deemed advisable, but to the efficiency of this act it was necessary that the consent of the stockholders was necessary, and by a provision of the act such consent was to be placed on file in the office of the Secretary of State. It is claimed that, not only was such assent never filed, but that the subject of the ratification of the act was never in any way brought before the stockholders, and that none of the boards of directors, either the separate or joint boards, ever acted upon it officially. They, therefore, deny the right to perfect a lease when the only act rendering such a contract possible was not ratified. The circumstances attending the proposed lease, and the attempt to have it ratified are reviewed. The act is claimed to be inefficient, even if constitutional and ratified, to give the works into the hands of a foreign corporation. The Pennsylvania Railroad Company "is incompetent and incapable of taking, having, holding or using said properties in this State, and of exercising said privileges or franchises in this State, or any of them, and that it is also incapable and incompetent to discharge the numerous trusts, duties and obligations which, by the laws of this State, have been and are imposed on the United Companies, and each of them, and from which duties these companies are alike incapable of discharging themselves, or of transferring them to others."

The act under which the lease is being carried out provides that the stock of dissatisfied holders shall be taken by the company at a fair valuation after the perfection of the lease. This, it is claimed, is unconstitutional, on the ground that the stock is actually taken from him at the time of the lease, and not paid for until the new owners have come into power, whereas the constitution provides that all property shall be paid for before it is taken.

In granting the charters of the different companies, the Legislature failed to retain any power by which they might be repealed or altered, and no general act affecting this point was passed until 1841. They, therefore, claim that without the consent of the companies the Legislature can pass no act altering such charter, and that for this reason the act under which the lease is being accomplished is imperative. They further show that the act only admits of consolidation with connecting lines, and assert that the road with which the consolidation is about to be made does not in any sense connect, it being separated from the line at Camden by the whole width of the city of Philadelphia, and from all other lines chartered by this State, by at least the distance from Mantua to Trenton, or 31 miles. By such a lease the boards of directors simply transfer their trusteeship in a matter where such a transfer is impracticable, unjust, and not in accordance with law.—*Exchange.*

Test of the Keokuk & Hamilton Bridge.

This bridge was tested May 18th, 1871, for Mr. J. Edgar Thomson, President of the Pennsylvania Railroad Company. The tests were made under the direction of Mr. Henry Pettit, Civil Engineer, Construction Department Pennsylvania Railroad, and all facilities for making them satisfactory were kindly furnished by Geo. S. Smith, the engineer of the bridge, resident at Keokuk, who has had charge of the work at the bridge site from its commencement to its successful completion.

The designs for the superstructure were furnished by Mr. J. H. Linville, Civil Engineer, the drawings being carefully worked up under the direction of Mr. M. Benner, at Pittsburgh. The superstructure was made and erected by the Keystone Bridge Company of Pittsburgh.

Commencing at the west or Keokuk end of the bridge, the spans are located as follows: Pivot span, total length of one truss, center to center of end posts, 376' 5"; opening under each arm of 160 feet measured on the square; 2 spans, 253' 6"; 8 spans varying in length from 148' 4 3-16" to 167' 7"; total length backwall to backwall on bridge seats, 2,102 feet. It is a through bridge built on a skew of 17° 15', with a distance between the two trusses of 21' 6". It carries a single line of railway track and two tramways for local traffic, the track being placed in the centre between the tramways. On each side of the bridge, outside of the trusses, are foot-walks 5 feet wide protected by light and substantial iron lattice railings.

When making the tests the level and rod were in charge of Mr. E. H. Worrall, Engineer of the Section Work, and Major A. H. Burnham, U. S. A., Engineer in local charge of the Des Moines Rapids Improvements of the Mississippi River near Keokuk.

The load used in making the tests was a train made up of five engines from the Des Moines Valley Railway, with their tanks and boxes full.

The following table shows the composition of this train:

Engines.	*Total Length Engine and Tender.*	*Weight of Tender.*	*Weight of Engine.*	*Total Weighs.*
No. 1	39 feet.	16 tons,	26 tons.	44 tons.
" 19	41' 7"	20 "	31½ "	51½ "
" 22	42' 5"	20 "	31½ "	51½ "
" 20	41' 7"	20 "	31½ "	51½ "
" 3	40' 5"	18 "	27 "	45 "
Totals...	205' 0"			243½ tons.

This load was placed so as to cover one-quarter of the span, when the deflections of the span were taken at the center and quarter distances. The span was then loaded one-half of its length, then three quarters, and finally its entire length. The deflections being taken each time at the same three points. Afterwards the permanent set was observed. All the lengths of spans given are the distances from center to center of the end posts.

Pivot span (the largest yet constructed.)

Total length of one truss..... 376 ft. 5 inches.
Arched upper chord. Depth of truss over drum... 35 ft.
" " at ends..... 27 ft. 9 inches.

Load of 95.5 tons on the east half of the east arm — 10.7 tons per foot lineal.

East arm of span—

Deflection of the east half..... 1-8 inch.
Deflection at the centre..... 15-32 "
Deflection of the west half..... 3-32 "

West arm of span—

Deflection of the east half..... 3-32 inch.
Rise of the center..... 3-32 "
Rise of the west half..... 3-64 "

Load of 178.5 tons, covering entirely the east arm = 1 ton per lineal foot.

East arm of span—

Deflection of east half..... 23-32 inch.
Deflection at the center..... 15-16 "
Deflection of the west half..... 23-32 "

West arm of span—

Rise of the east half..... 1-32 inch.
Rise at the center..... 1-8 "
Rise of the west half..... 3-65 "

per sq. in.
Strain of compression at center of upper cord of east arm..6,752 lbs.
Strain of tension at center of lower chord of east arm. ...7,063 "

Load of 103 tons on east arm and 96.5 tons on the west arm = .56 tons per foot lineal.

East arm—

Deflection at the center..... 23-32 inch.

West arm—

Deflection at the center..... 15-32 inch.

Permanent set after all load was removed.

East arm—

East half..... 1-80 inch.
Center..... 1-27 "
West half (next the drum)..... 1.16 "

West arm—

East half (next the drum)..... 5-32 inch.
Center..... 1-86 "
West half..... 1-27 "

Time of turning the pivot the entire opening of 72¾°.

With the engine..... 2 minutes.
With six men..... 2 minutes 30 seconds.

Span No 3.

Length, 253' 6". Height of truss, 27 feet.

Ratio of height to length = 1 to 9.388. Load of 68 tons on the east quarter = 1.07 tons per foot lineal.

Deflection of the east half..... 5-32 inch.
Deflection at the center..... 1-8 "
Deflection of the west half..... 1-27 "

Load of 147 tons on the east half of span = 1.16 tons per foot lineal.

Deflection on the east half..... 19-32 inch.
Deflection at the center..... 25-32 "
Deflection of the west half..... 13-32 "

Load of 198.5 tons on the east three-quarters of span = 1.04 tons per foot lineal.

Deflection of the east half..... 31-32 inch.
Deflection at the center..... 1 3-8 "
Deflection at the west half..... 29-32 "

Spread of the lower chord measured at the roller box = 3-16".

Load over the entire span of 243.5 tons = .96 tons per foot lineal.

Deflection of the east half..... 1 5-32 inches.
Deflection at the center..... 1 11-16 "
Deflection of the west half..... 1 1-4 "

Spread of the lower chord measured at the roller box = ¼".

Strain at center of upper chord, compression — 8,962 lbs. per square inch.

Strain at center of lower chord, tension — 9,251 lbs. per square inch.

Span No. 2.

Length, 253' 6". Height of truss, 27 feet.

Load of 243.5 tons over center span — .96 tons per foot lineal.

Deflection at center of span — 1¾ inches.

Permanent set after load was removed — 3-64 inches.

Span No. 4.

Length, 159 feet 9½ inches. Height of truss, 21 feet.

Ratio of height to length, 1 to 7.6.

Load of 44 tons on the east quarter — 1.1 tons per foot lineal.

Deflection of the east half..... 9-32 inch.
Deflection at the center..... 5-16 "
Deflection of the west half..... 19-32 "

Load 95.5 tons on the east half — 1.19 tons per foot lineal.

Deflection of the east half..... 7-16 inch.
Deflection at the center..... 23-32 "
Deflection of the west half..... 7-8 "

Load of 147 tons on the east three-quarters of span — 1.22 tons per foot lineal.

Deflection of the east half..... 5-8 inch.
Deflection at the center..... 1 "
Deflection of the west half..... 1 3-16 "

Load of 153 tons over the entire span — .905 tons per foot lineal.

Deflection of the east half..... 25-32 inches.
Deflection at the center..... 1 5-32 "
Deflection of the west half..... 1 5-16 "

Permanent set after load was removed. At the center of span — ¼ inch.—*Journal of the Franklin Institute.*

—The average fares of the Russian railways are lower than even the low German fares: first-class, not quite three halfpence an English mile; second class, little over a penny; third class, little over one halfpenny. On the Petersburg-Moscow line the third class fare is but one-third of a penny per English mile. The Russian first-class carriages are among the best in the world, the second and third classes are but slightly inferior to those of Germany, and superior to those of all other countries. On the Petersburg-Moscow line (and I believe on some other lines also) sleeping-car accommodation in special compartments may be had for all three classes, with proportionate comfort, and at very moderate charges. A third-class passenger who makes use of the sleeping compartment pays but one halfpenny a mile for his seat and the sleeping accommodation together. Very few travelers are injured by fatal accidents on the railways. There were, in 1869, no more than five or six injuries to travelers owing to this cause. A very large number of persons, however—the greater part engineers, laborers, and other persons employed on the railways, some peasants and a few travelers—have been run over by trains or otherwise injured on the railways. Although nearly 400 such cases are recorded in one year, the injury to travelers who commit no imprudence are only in the proportion of one injury to 2,000,000 travelers.—*Pall Mall Gazette.*

—The Bethlehem (Penn.) *Times* says: "The oldest locomotive engineer in the United States is Barney Butz, who now runs an engine on the Lebanon Branch of the Reading Railroad. Barney was born in Conyngham, Luzerne County, Penn., and went on the Beaver Meadow Railroad about the year 1835 or 1836. In 1837 he was running an engine from Perryville to Weatherly, the planes being then in operation. The cars were drawn up the planes by a stationary engine, and were then drawn into the Beaver Meadow mines by a locomotive engine. A good story is told of Barney's readiness in case of emergency. One day his engine would not make steam well, and he was likely to be overtaken by a passenger train before he could reach the turn-out. Seeing a good-sized porker along the track, he jumped from his engine—the train moving very slow—seized the pig, cut his throat, and stuffed him into the furnace. The fat of the pig was better than kindling wood, and in a very short time Barney had steam up, and was out of danger."

—The Mechanics' Institute of the City of Buffalo will hold a second "International Industrial Exhibition" in the Skating Rink on Pearl street, in Buffalo, commencing September 18 and closing October 14. Entries may be made from the 4th to the 15th of September, and all manufacturers, artisans, artists and inventors of the United States and Canada are invited to exhibit.

—General Weitzel, in charge of the Louisville Canal enlargement, has written to the Cincinnati Chamber of Commerce that after the canal is closed, July 10, it will not be opened, even for a single day, during the three months determined on by the directors for the completion of the work.

ATLANTA CORRESPONDENCE.

ATLANTA, GA., July 7, 1871.

Pursuant to a call by President Campbell Wallace, the first meeting of the directors of the "Georgia Western Railroad Company" was held at James' Bank yesterday, Mr. J. H. James was elected Vice-President and Colonel W. P. Orme, Secretary and Treasurer, was re-elected. The books for the subscription of stock were opened to-day. The work of surveying the route will begin immediately. The proposed route is in a westerly direction from Augusta to Taladega, Ala., thence through St. Clair and Shelby counties, the great coal and iron fields of Alabama, to Birmingham, near Elyton, where it intersects the Alabama & Chattanooga, South & North Alabama and the Savannah, Opelika & Memphis roads. From Birmingham it will continue nearly due west to Gaines' Landing, on the Mississippi River, crossing the Mobile & Ohio Railroad somewhere between Aberdeen and Columbus and the Mississippi Central at or near Winona. At the meeting of the Directors yesterday, a 5-feet gauge was decided on. Stock is being rapidly subscribed, and the road will, under the able management of its officers, soon be built to Birmingham.

Work is rapidly progressing on the Atlanta & Richmond Air Line Railroad. About 120 miles have been graded and 74 miles of track laid. The shops and round-house will be built here. Mr. Josiah Sherman, Master Car-Builder of the Western & Atlantic Railroad, is building an "Ice Car" for conveying the ice from the Atlanta Ice Company's works on the Chattahoochie River. It is built in the form of an ordinary freight car and lined, leaving a space of six inches between the outer and inner walls and twelve inches between the roof and ceiling, which space is filled with sawdust. A double partition is built each side of the doors also filled with sawdust. Each partition has a door for admitting the ice, which will be piled up in the car without sawdust or other covering. R.

Circular of the Illinois Railroad and Warehouse Commissioners.

The following is the first circular of the Railroad and Warehouse Commissioners of Illinois, which is issued under date of July 14, and sent to each railroad company in the State:

SPRINGFIELD, ILL., July 14, 1871.

To the President and Directors of the —— Railroad Company:

The undersigned desires to inform you that they have been appointed by the Governor of the State of Illinois, Railroad and Warehouse Commissioners, under the act entited "An Act to establish a Board of Railroad and Warehouse Commissioners, and prescribe their powers and duties," approved April 13th, 1871, in force July 1, 1871.

They have organized under the law by appointing Gustavus Kœrner, Chairman of the Board, and James H. Raymond, Secretary thereof, and have established an office in Springfield, as the law provides.

The object and intention of the law which creates this board, and which law, as also several kindred ones, have been passed in conformity with the express provisions of our new constitution, are very plain and easily understood.

It seems to us that the Constitutional Convention, as well as the Legislature, complying with the demands of the constitution, were alike actuated by a desire to harmonize the interests of our railroad system with those of individual citizens and the public at large throughout the State.

The importance of the railroad interests, both to those whose capital has constructed them, and to the people whose persons and property are so largely conveyed by them, is so great, that it is in the highest degree desirable that the rights and duties of both the railroads and the people should be harmonized. We do not believe that there is any necessary conflict between the real interests of the railroad companies and those of the people of the State at large. So far from this, we are fully convinced that both interests will be best promoted by a wise and just regard of each to the rights of the other. The railroads and the people are alike interested in the prosperity of the State, and whatever tends to increase its general wealth and advance its business interests benefits the railroads sooner and more directly than any other class of property in the State.

We do not desire in any way to impair or destroy by unreasonable or unfriendly action the vast interests invested in railroads, nor to subject them to any oppressive rules or regulations. On the other hand, we do intend firmly to protect to the utmost of our power the State itself and its citizens from all violations of law on the part of any railroad company or its officers.

The Board of Commissioners, as it is their duty, will endeavor to carry out the various legal provisions which have been enacted in regard to railroads in Illinois. We earnestly request a cordial co-operation to this end on the part of the road which you represent. As some of those provisions are new, and others though old seem to have fallen into oblivion, we desire to direct your attention to several of them: First—to the eleventh article of the present constitution, sections 9, 10, 11, 12, 13 and 14, and especially to section 15. The latter section provides that the General Assembly shall pass laws to correct abuses, and prevent unjust discrimination and extortion in the rates of freight and passenger tariffs on the different railroads in this State, and enforce such laws by adequate penalties.

We also invite your attention to the 13th article of the constitution entitled "Warehouses," the 4th and 5th sections of which contain provisions applicable to railroad companies.

The law establishing this board, referred to above, is of importance to you, and is recommended to your earnest consideration. The 6th section of this law requires your company to report to this board on or before the first day of September of each year, and to make a full and true statement, under oath, of the affairs of your company as the same existed on the first day of the preceeding July. The section specifies distinctly the subjects of this report, and by following the order in which they are stated we expect to obtain the proper uniformity in the reports made to us.

The board will thus be enabled to lay before the Legislature, in their own annual report, a full tabular statement of all the railroads in the State.

The 7th section of the act authorizes the board to put additional questions to railroad companies to be answered in the same manner as those specified in section 6. For the present we require your company, in addition to the information to be given under said 5th section, to report also all accidents occurring on your road and its branches for the year ending July 1, 1871, by which persons have been killed or injured. You will give first a list of passengers killed within the year, and also of those wounded, stating the time and place of each injury, and also stating those who were injured by their own misconduct or carelessness; next, the number of employes killed or wounded, and also stating the cause of the injury and the time and place; next, the names of other persons killed or wounded, who were neither passengers nor employes, together with a statement of the cause of each accident in detail. You will also inform the board whether any such accident has arisen from the negligence or carelessness of any person in the employ of your company and whether such person was retained in the service of the company after such accident.

Inasmuch as the act entitled "An act to establish a reasonable maximum rate of charges for the transportation of passengers on railroads in this State," in force July 1, 1871, requires that all railroads in this State shall be classified according to the gross amount of their respective annual earnings per mile in four (4) different classes, you will at once proceed to classify your company and return to this board, on or before August 1, 1871, the gross amount of your last annual earnings, that is to say, from the first day of July, 1870, to the first day of July, 1871; and also the total length of road operated by you on which said earnings were made.

Your particular attention is called to the 4th section of the last mentioned act, which requires you to keep posted in a conspicuous place in every depot a printed copy of that act, with a table of distances between each and every station, and a statement showing the class to which your road belongs.

Another act was passed on the 25th of April, 1871, entitled, "An Act regulating the receiving, transportation and delivery of grain by railroad corporations, and defining the duties of such corporations with respect thereto." This law re-enacts provisions already embodied in laws passed in 1867 and 1869, but contains some additional features which require your earnest attention.

There are scattered through our statutes various laws regarding railroads, generally of the character of police regulations. Many of them are also embodied in the charters of the respective companies. It is a matter of notoriety that such regulations have been often disregarded or not properly observed. You will, therefore, not fail to call the attention of your employes to a strict observance of any such police or other laws, either in your charter or the general statutes of the State.

In this connection we call your attention to several sections of the general Statue Laws of the State. Gross' Statutes, 1869, p. 541, known as the General Railroad Law, sections 34, 35, 36, 37, 38, 39, 40 and 45; also to the law of 1854, Gross' Statutes, p. 537, concerning the consolidation of lines; the law of 1855, Gross' Statutes, p. 539, concerning fencing; the law of 1868, Gross' Statutes, 538, regarding the consent of stockholders to consolidation and leasing of roads; the law of 1869, Gross' Statutes, p. 549, in regard to precaution in crossing; and the act entitled "An Act concerning railroads," passed March 10, 1869, Gross' Statutes, p. 550.

We have thus, as briefly as possible, directed your attention to the various provisions made by law for the management and operation of railroads in this State. There may be others which have escaped our examination, which of course have to be as fully observed as those which we have cited.

The times admonish us by lessons of fearful import, that capital can only be fully protected by its willingness to enter into just relations with the necessities of the public, and in reconciling its own interests with those of the community of large. In a spirit of liberality, but with a strict regard to our duty, we shall insist on a faithful execution of those rules found in our fundamental law and in our statutes, relying, however, confidently, that your company will recognize its true interests as identical with those of the people, for whose mutual protection those laws have been devised and passed.

GUSTAVUS KŒRNER,
RICHARD P. MORGAN, JR., } *Commissioners.*
DAVID S. HAMMOND,
J. H. RAYMOND, *Secretary.*

—Judge Blatchford, of New York, in the case of the English Erie stockholders, decided that defendant must cause 30,000 shares of stock, represented by certificates issued ta the Receiver, to have the privilege of registration restored to them.

MECHANICS AND ENGINEERING.

The Car Shops of the Housatonic Railroad.

This company, understanding the advantage of using cars built and repaired by themselves, have always maintained shops for this purpose at their southern terminus, in Bridgeport.

With a force of fourteen carpenters, and the proper proportion of other mechanics, Mr J. Ferris, the Master Car Builder, turns out about 75 cars a year, constructing every part in the shops of the company.

In the construction of the floor framing, he bolts the bolsters to the under side of the longitudinal floor timbers, and thus avoids cutting into and weakening them.

The side-bearings are fixed at about half the usual distance from the center bearing, under one of the intermediate longitudinal floor-timbers, thus allowing the truck to swivel more easily, and allowing of smoother motion of the car.

The company has now 45 milk cars, which may be used indifferently for the transportation of milk or for ordinary freighting purposes. They are the usual box cars, but having, at the front and back ends, ventilating holes 3 inches in diameter and about 6 feet above the floor. Two ice-vats, each about 8 inches deep and 2 feet wide, are provided, fixed about 4 feet from the floor, extending quite across the car—one at each end. These vats are lined with zinc, and have a waste-pipe for conducting off the water from the ice. The air, entering at the ventilators, passes over the ice in the vats and then finds its way over the floor where the milk cans stand, thus effectually cooling them.

The company is applying spring-cushioned backs (about 3 feet 6 inches high) to the seats on one of their passenger cars. Two links are contrived, each hinged at one end to the back, at the other to the arm of the seat, so that the cushion may be turned in the ordinary space, a result which could not be effected in the common way, where there is only one link.

Mr. Ferris makes use of a vulcanite emery-wheel for fitting his boxes. This wheel is a cylinder, a little longer than the box and a little less in diameter than the journal, and does its work quite rapidly and without perceptible wear. The boxes, while being ground, are occasionally tested on a mandrel to insure accuracy. Fitted in this way they seldom heat, whereas when they are finished with a file there is considerable trouble on this account.

The Great Steel Rail Mill in Bethlehem, Pa.

The new steel rail mill at Bethlehem, Pa., now erecting by the Bethlehem Manufacturing Company, under the direction of John Fritz, their Chief Engineer and Superintendent, will be, when done, the largest in this country, and one of the largest in existence. It consists of a building 105 feet wide spanned by an iron and slate roof without supporters. It is 30 feet high to the eaves, and is in the shape of a cross, of which the long arm will be 900 feet and the short arms 142 feet each, making 1,184 by 105 feet area, or nearly three acres covered. This is only surpassed by the mill at Creusot, in France, which consists of three buildings 60 by 1,400 feet each.

The capacity of the works is to make 300 tons of steel ingots per day, but at present machinery will be erected for rolling but 100 tons of rails, or more than double the capacity of the largest mill yet erected. There will be eight 5-ton converters and two train rolls, one of 24 inches and one of 28 inches diameter, driven by two condensing engines of 48 and 56 inches diameter of cylinders and 44 and 48 inches stroke.

This mill will be remarkable not only for its enormous size and capacity, but for the many new labor-saving conveniences introduced into the design of the plant by the Engineer, Mr. Fritz, who has examined personally all the Bessemer steel works both here and abroad before designing this.

It is the opinion of experts who have seen it that it will turn out more tons of steel rails with less manual labor than any other mill has ever done.

Car Coupling.

Mr. John A. Mason, of Keokuk, Iowa, is taking measures to introduce a car coupling of his invention, which, in general appearance, is somewhat similar to the Miller platform. There are compression buffers at the ends of the sills, immediately over the coupling hooks, and the coupling is effected by hooks which spring sidewise, as in Mr. Miller's arrangement. The springs, however, for keeping the hooks together and preserving the coupling, are not attached to the drawbar, but are spiral springs placed on a vertical shaft, with a hand wheel, and from the shaft is an arm and link connecting with the hook.

The hook differs in form materially from Miller's, and no adequate idea of it can be given without a model or drawing. The inventor claims advantages for it, that automatic coupling may be effected though the cars vary 8 or 10 inches in hight; that a much larger bearing surface is secured, and consequently a more reliable connection; that on curves there is no danger of uncoupling; that there is no transverse strain, or shearing stress, of the drawbar—and consequently it may be made much lighter—and that it is applicable to freight cars, and as much "slack" as necessary can be secured.

—On the 26th of October last, as the west-bound mail train on the Chicago, Rock Island & Pacific Railroad was passing through Joliet, at noon, it run over and killed Wilson Wigent, at the crossing of the principal street; for the doing of which the grand jury found an indictment for manslaughter against Oliver Peaselee, the engineer of the train. He was arrested, and gave bail in the sum of $50,000. On the 12th inst. a jury was obtained for the trial of the case. The railroad company have furnished eminent counsel for the defence, and much interest is taken in the suit.

—The California excursion party from Indianapolis passed through Peoria, July 12, filling four coaches.

RAILROAD GAZETTE

PUBLISHED EVERY SATURDAY.

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Editorial Announcements.

Correspondence.—*We cordially invite the co-operation of the Railroad Public in affording us the material for a thorough and worthy Railroad paper. Railroad news, annual reports, notices of appointments, resignations, etc., and information concerning improvements will be gratefully received. We make it our business to inform the public concerning the progress of new lines, and are always glad to receive news of them.*

Inventions.—*Those who wish to make their inventions known to railroad men can have them fully described in the* RAILROAD GAZETTE, *if not previously published,* FREE OF CHARGE. *They are invited to send us drawings or models and specifications. When engravings are necessary, the inventor is expected to furnish his own engravings, or to pay for them.*

Articles.—*We desire articles relating to railroads, and, if acceptable, will pay liberally for them. Articles concerning railroad management, engineering, rolling stock and machinery, by men practically acquainted with these subjects, are especially desired.*

Engineering and Mechanics.—*Mr. M. N. Forney, Mechanical Engineer, whose office is at Room 7, No. 72 Broadway, New York, has been engaged as Associate Editor of this journal in charge of these departments. He is also authorized to act as our agent.*

☞ *Our Prospectus and Business Notices will be found on the last page.*

COST OF ROAD-BED FOR WIDE AND NARROW-GAUGE RAILROADS.

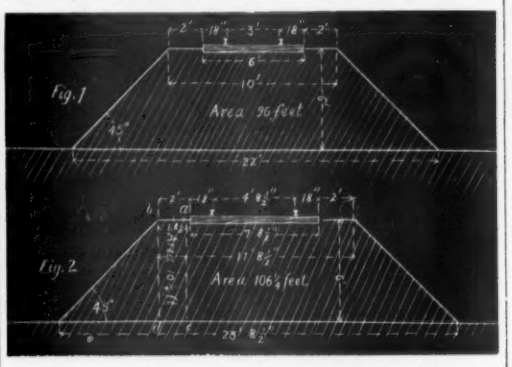
Last week we showed that the weight of four-wheeled cars for a 3-feet gauge is only about two per cent. less than for a 4-feet 8½-inch track, and that this increase is less than one per cent. of their total weight loaded, if, as is stated, the former will carry three times their weight of freight. This difference is so slight as to be practically inappreciable in its effects upon the rails, and therefore they need be no heavier for such cars for a 4-feet 8½-inch gauge road than for one of 3 feet. We will show presently that the difference in stability of the cars on the wide-gauge will much more than compensate for their difference in weight.

Many who favor narrow-gauge roads seem be honestly of the opinion that a locomotive of a given weight and capacity will draw a *heavier train* on a narrow-gauge road than an engine of the same weight and dimensions will on a wide-gauge. If there were any reason for believing that the law of gravitation acts differently, or that a pound of coal will generate more steam, when the rails are near together than when they are farther apart, there might be some grounds for such an opinion. A driving-wheel which carries a weight of 5,000 pounds will have just as much adhesion, and a boiler will be equally efficient on the one road as on the other, so that locomotives must be just as heavy to pull a train which will weigh a hundred tons on the narrow gauge as on the wide. This fact completely undermines the idea, which is so very prevalent, that it is practicable to run over much steeper grades with narrow gauge roads than with wide. A twelve-ton locomotive will not pull a heavier train up a grade of 50 feet per mile on a 3-feet gauge than it will on a 4 feet 8½-inch road of the same inclination.*

It is true that *if* the cars for a narrow-gauge road weigh, relatively to the load they carry, less than those for a wide gauge, then, to that extent, the amount of freight carried on a train of any given gross weight would be greater on the narrow than on the wide gauge; but the whole force of the argument rests upon the supposition that the narrow-gauge cars *do* weigh materially less than cars of the same capacity would for the ordinary gauge, which we have shown is not the case, and consequently the arguments based upon such a supposition are erroneous.

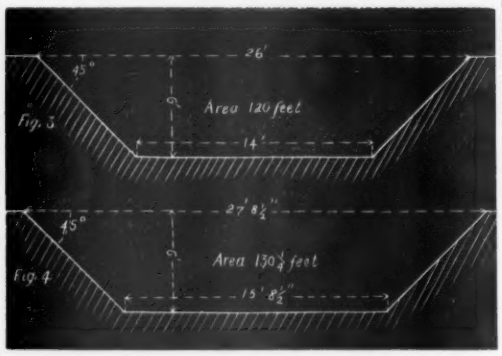
The question to be considered is not whether four-wheeled cars will carry more on a narrow gauge than those with eight wheels will on a wide; nor whether box cars for wide-gauge roads weigh more than platform cars do for narrow. Neither is it a question whether it is more economical to run small cars on a narrow gauge than large ones on a wide, but it should be a comparison of the cost of running four-wheeled platform cars on one road with four-wheeled platform cars on the other, or eight-wheeled box cars on the one with eight-wheeled box cars on the other: if for light) traffic there is an advantage in having small cars, they can be made of the same capacity for the wide road as easily as for the narrow.

As an example of the kind of reasoning which is based upon this idea of the reduction of the weight of



cars, we quote from a printed report of the Executive Committee of the Iowa Narrow-Gauge Railroad Company, in which they say that "the best informed engineer on narrow gauge that we found" stated "that a "16-ton engine will haul with ease 92 tons of freight "up a grade of 105 feet to the mile at a speed of 12 "miles per hour, while a 30-ton engine on a wide road "will not haul over 82 tons of actual freight under the "same circumstances, the weight of cars making the 'difference." Now a 30-ton engine will pull 90 per cent. more than a 16-ton engine. If the cars for this narrow-gauge road weigh only one-third as much as the freight they carry, their weight would be, in even numbers, 31 tons, making a total load of 123 tons which the 16-ton engine hauls. If now we add 90 per cent. to this we will have 233 tons as the load which the 30-ton engine will haul. Deducting the 82 tons of freight and we have 151 tons as the weight of cars required to carry it, which it is said 'makes up the difference."

In other words, from this statement it would appear that cars to carry 82 tons of freight on the ordinary gauge, "under the same circumstances," weigh nearly *five* times as much as the cars which carry 92 tons on the narrow-gauge. Now, if these figures are correct, that



is, if the cars for the wide-gauge roads weigh five times as much as those for narrow, then locomotives on the one road will haul more *freight* than on the other, and consequently narrow-gauge roads run steeper grades and carry more freight than when rails are the ordinary distance apart; but if cars for a 4-feet 8½-inch gauge do not necessarily weigh five times as much as those for a 3-feet road, but, on the contrary, will weigh only a little over two per cent. more than the narrow-gauge cars, then it is clear that it will not be practicable to run over steeper grades on the one road than on the other, and consequently the engines must be just as heavy in the one case as in the other.

If, then, both the cars *and* the locomotives are of practically the same weight for both roads, it is difficult to see why the rails, spikes or fish-plates need be any heavier, or why the ties require any more bearing surface for a road of one gauge than for the other. Light rails can be laid down on a 3-feet gauge road as well as on one of 4 feet 8½ inches. Their weight should be governed by the size and capacity of the rolling stock with which the road is equipped, and not by the gauge. Therefore, all calculation of the relative cost of wide and narrow-gauge roads are fallacious in which light rails and fastenings are compared with heavy ones, because the weight of the rails, spikes and fish-joints, or chairs, are entirely independent of the gauge, and are governed by other considerations, and not by the distance between the rails.

It is claimed that one great source of economy in the construction of narrow-gauge roads is the saving in grading. This is variously estimated, and the difference nearly always exaggerated. That an embankment for a 3-feet track will cost as much as for a 4-feet 8½-inch, we are not foolish enough to assert, but we do believe that the difference between the two would not compensate for a break of gauge and all its attending inconveniences. We give diagrams of sections of an embankment—figs. 1 and 2—and a cut—figs. 2 and 3—for a wide and narrow-gauge track. We have taken the length of ties for the 3-feet gauge at 6 feet, which would allow a projection beyond the inside of rail of 18 inches. The width of the embankment at the grade line we have made 11 feet; it will, therefore, extend beyond the ties 2 feet on each side. Inasmuch as the loaded cars and locomotives need not weigh one per cent. more for a 4-feet 8½-inch than for a 3-feet gauge, we can put down the same weight of rails in each case, and the ties need not extend any further beyond the rails in the one case than in the other. They will, therefore, be 7 feet 8½ inches long, and with the embankment extending an equal distance beyond them, it will be 11 feet 8½ inches wide on grade line. Supposing, now, that we have an average "fill" of 6 feet; then the difference in their areas will show the relative difference in the quantity of material in each. Taking the slopes at 45°, the area of cross section for the one gauge will be 96 and for the other 106¼ square feet, showing a difference of less than 10 per cent. in favor of the 3-feet gauge. Taking the width of cut at grade line at 14 feet, a similar calculation will show a quantity equal to 8 per cent. less in the narrow-gauge cut than in the wide. It will be observed that the percentage of difference increases with the depth of the cut or height of embankment. The area of cross section of embankments, similar to the above, 12 feet high, would be 264 and 284½ feet, being only about 7 instead of 10 per cent. less for the 3-feet gauge than for the 4-feet 8½-inch. This is owing to the fact that the slopes are independent of the gauge. The only difference between the two is that due to a parallelogram (*a*, *b*, *c*, *d*, fig. 2) whose width is equal to the difference of the gauges and whose height is that of the embankment. The same is true of the cuts. Therefore, the percentage of saving in the cost of grading diminishes as the amount of cutting and filling increases. With an average depth of cuttings and embankments of six feet, the difference between grading for a 3-feet and for a 4-feet 8½-inch gauge, for the same character of rolling stock, would be about 9 per cent. less for the former than for the latter, and for an average of four feet it would be about eleven for embankments and nine for cuts, or a average of 10 per cent. Of course the character of the country will govern this. In a comparatively level region, 10 per cent., and for a more hilly section, 6 to 8 per cent. would be about the difference between a 3-feet and a 4-feet 8½-inch road of the same character of grades and alignment.

In discussing the relative cost of grading for the wide and narrow gauge, the advocates of the latter argue that, inasmuch as the amount of slipping of the wheels in passing around curves is more in wide-gauge roads than in narrow, therefore shorter curves are practicable if the rails are near together. The committee of the Legislature of Massachusetts, to whom was referred the subject of narrow-gauge railroads, in their report, say: "It permits the use of curves, entirely impracticable for roads of common gauge, the minima of the "two gauges be practically as one to three, the radii "being, say 220 feet and 660 feet respectively, and it "considerably increases the grade maximum as well."

It will be observed that this committee do not give the grounds on which the opinion is based. The fact that the slip of the wheels is less on a narrow-gauge than on a wide is indisputable, but the degree of curvature on the main line of a railroad is not limited by the consideration, but *by the speed at which the trains run.* It is not because the wheels slip that a train is in danger of leaving the track in running on a curve, but because the centrifugal force has a tendency to carry it in a straight line. To resist this the outer rails are elevated just in propertion to the degree of curvature. Now, obviously, this elevation must produce very great lateral oscillation if the trains are run at a high speed, an evil which would be much more dangerous if the wheel-base of the cars and engines were narrowed. What would

*We should, perhaps, make an exception slightly in favor of the narrow gauge, in cases where sharp curves and grades occur simultaneously.

be gained, therefore, by reducing the slip of the wheels on curves, by narrowing the gauge would be much more than over-balanced by the loss of stability. It will be no answer to this to say that the cars for a narrow-guage are made smaller and lower, and, therefore, have as much stability as those for a wide-gauge, because cars can be made just as small and just as low for a wide as for a narrow-gauge road, and being wide, they will therefore have more stability.

It is true that the train resistance is increased by placing the rails further apart, but very little accurate knowledge exists with reference to the *proportion* of power absorbed by the friction of the flanges, and that of the tread of the wheel in passing around curves. The one is constant for all gauges, the other varies with the distance betw een the rails.

Some of the advocates of 3-feet-gauge roads are evidently aware of the weakness of this argument. In a pamphlet, written by one of the ablest of them, he says: "I differ from some of my engineering friends, "who state the advantage the narrow-gauges will "afford us in supplying facilities for the increase of this "costly and most undesirable feature in our roads. On "the contrary, I rejoice that it will afford us the means "of keeping our roads "more direct, and as near "the perfection of the "straight line as possible."

On the Festiniog line we are told that the shortest curve is 115 feet radius, but the *average* curves are 400, 450 and 500 feet. It would, of course, be interesting to know the location on the line of road of the curves of 115 feet radius, and the speed at which it is worked. On the Toronto, Grey & Bruce line the shortest curves are said to be of 480 feet radius. Now the Baltimore & Ohio road—4-feet 8½-inch gauge—has had until quite recently curves of 406 feet radius on its main line. Some of the branches of the Pennsylvania Railroad have curves of 350 feet radius. These curves, it must be remembered, are worked at the ordinary speed. When curves are run slowly, as they must be on entering stations, they are run on curves as short as 38 feet radius, as they do now in entering the Harlem & New Haven station, at Twenty-seventh street in New York. We see, therefore, that the shortness of the curves that can be worked is a question of speed and not of gauge. If the cars are run as slowly on a 4-feet 8½-inch as they are in a 3-feet gauge, the curves may be of just as short radius.

The advantage, therefore, which is claimed for the narrow-gauge roads, that the cost of grading may be reduced because sharper curves are practicable, is attributable not to the reduction in the gauge but in the speed. Inasmuch as trains can be run just as slowly on a wide as on a narrow-guage road it is difficult to see where, in this respect, the one has an advantage over the other.

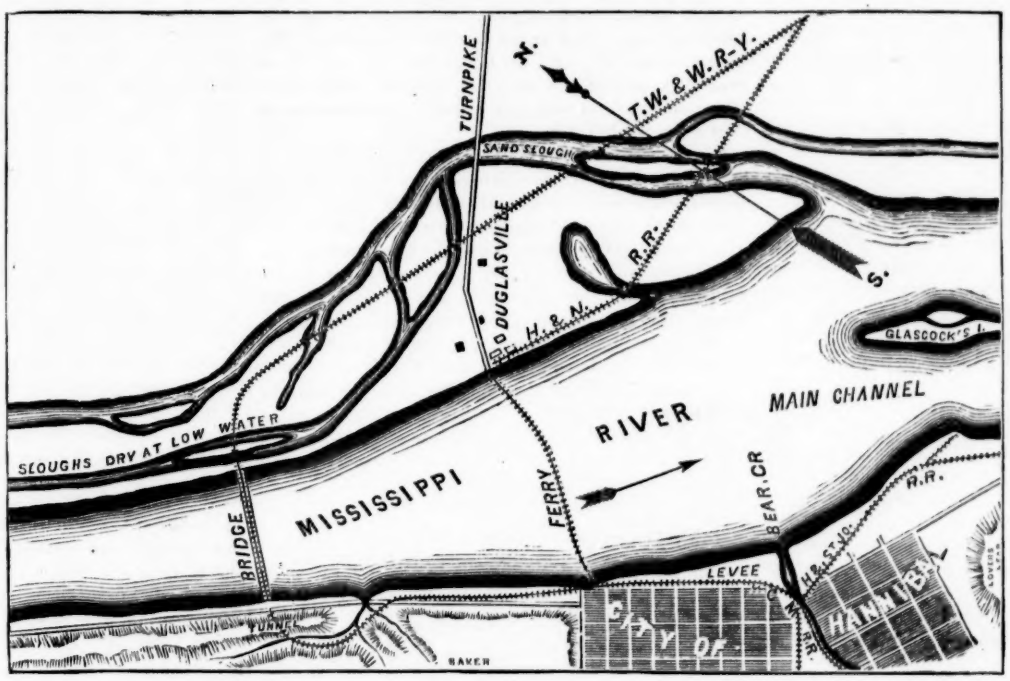
We have called attention so often to the fact that nearly all the arguments in favor of narrow-gauge roads are based upon the assumed reduction in the weight of rolling stock, that our readers may grow weary of the reiteration; but, even at the risk of becoming tedious, we will again call attention to the relation of this fact to the cost of bridges. Our narrow-gauge friends say "our cars weigh so much less that our bridges will cost only about half as much." Now we say that cars can be built for a 4-feet 8½-inch road of the same carrying capacity as for the 3-feet gauge, of the same width and height, which will weigh only about 1 per cent. more than yours when loaded, and, therefore, practically, our bridges need be no heavier nor more expensive than yours. To use legal phraseology: we deny their main premise and call for the proof.

We do not, of course, say that a light narrow-gauge road cannot be built, equipped and worked, with a light traffic, cheaper than an ordinary heavy 4-feet 8½-inch road. What we are arguing for is, that to build a cheap road it is not at all necessary to narrow the gauge, and that light 4 feet 8½-inch roads can be built, equipped and operated at a price so near that of narrow-gauge roads of the same character that the difference would not compensate for the inconvenience, loss, and ultimate disadvantage which would result from a break of gauge.

In a future number we will have something to say of the rolling stock of such roads, with some estimates of their cost and a comparison with that of narrow-gauge lines of the same character.

THE HANNIBAL BRIDGE.*

This combined railroad and highway bridge over the Mississippi River, at Hannibal, Mo., has just been completed, the seventh structure that spans the great river, below Dubuque. The work has been completed under the administration of the "Hannibal Bridge Company," formed by the consolidation of two companies—the "Pike County Bridge Company," incorporated in Illinois in March, 1867, and organized June 4, 1869, with Alexander Starne, President and Ozias M. Hatch, Secretary and Treasurer; and the "Hannibal Bridge Company"—incorporated in Missouri, May 24, 1869. In December, 1869, the consolidation was effected under the present title of the company, Mr. John T. K. Hayward, of Hannibal, was elected President and Ozias M. Hatch, of Springfield, Ill., Secretary. The present organization of the company is: Alexander M. White, President; Isaac M. Knox, Secretary and Treasurer; Warren Colburn, Consulting Engineer; Col. E. D. Mason, Chief Engineer, with E. L. Corthell and Eliot Clarke as assistants.



Map of the Mississippi River at Hannibal, Mo. Showing Location of the Hannibal Bridge and Approaches.

SCALE, 2,000 ft. = 1 in.

On the 27th of June, 1870, Colonel Mason, with his corps, commenced the preliminary surveys, making minute examinations of the river bed and the underlying strata at various possible crossing places. By means of sounding rods, he bored to a depth at some points of 110 feet below low-water mark. The direction and velocity of the current was carefully noted by the use of floats, and the line of the bridge was located at right angles to it. A base-line of 1,620 feet was accurately measured, and its extremities indicated by raised monuments. From this line as a base all the positions for the piers were located by triangulation, and afterwards tested by actual measurement with a steel wire, proving their accuracy.

On the 29th of July, 1870, a contract for both substructure and superstructure of the bridge proper, between and including the abutments on each side of the river, was entered into with the Detroit Bridge & Iron Works. The plans for the substructure had been previously prepared by Col. Ed. D. Mason, the Chief Engineer. The Bridge Company adopted the plans of superstructure as designed by Willard S. Pope, Engineer of the Detroit Bridge & Iron Works. The agreed price for the whole was $485,000. By the terms of the contract the work was to be completed ready for use within one year. The time was very short—much less than that before given for any similar work; but the contractors have met the requirement.

This bridge belongs to the general class of "low bridges," placed but a short distance above the high water mark and furnished with a draw span over the channel to permit the passage of steamers and river craft generally. The comparative advantage of high and low bridges over navigable streams is a question of money only. The high bridge, offering practically no obstruction to river traffic at any stage of the water, and requiring no attention on the part of its keepers in distinction from the constant service required at a draw, presents, in this respect, points of superiority over the low bridge. But the increased hight of the piers, and the length of approaches necessary to attain the elevation, adding very largely to the cost of the structure, led in this case to the adoption of the low bridge and draw as the most economical structure. Confirmations of this opinion are furnished by the bridges at Quincy, Burlington and Kansas City, as well as by the plan adopted for the bridge to be built at St. Joseph. At St. Charles, St. Louis and Leavenworth high bridges have been favored and adopted for reasons other than those of economy.

The bridge under consideration is nearly identical in form with those at Burlington and Quincy, differing only in some of the mechanical details. One of the more important distinctive features is the form of the struts or posts used. These are composed of two parallel channel or I beams secured a short distance apart by diagonal bracing of wr. ught iron straps, forming an open work strut, the interior of which is accessible to the brush of the painter, whose attention is frequently needed to prevent rust—the destroying enemy of iron structures. The free ventilation afforded prevents the condensation of moisture in the interior and consequent rust, a salient feature of the tube-like "Phœnix column." In weight for the same strength there is little difference, while the facility of construction is slightly in favor of the new form. The form of the chord link differs from that used at Quincy in being formed of bars and eyes, instead of the experimental form built there of elongated links drawn out from a flattened ring. The upper chord shows an important modification. Instead of being of continuous size throughout, the ends of each section are considerably enlarged and the abutting faces planed exactly perpendicular to the axes of the beams, thus adding much to their stiffness and allowing the omission of the short diagonal lateral braces. The increased size of the chord at the joints permits the passage of the tie rod to an interior fastening, instead of being secured to a *lug* on the outside.

The foundations, upon which depend the permanency of the work, in all cases—excepting that of the west abutment, which is built up from the rock—are supported upon pile bases. The piles in piers 2 and 3 were driven to the rock, and at the other piers they were driven until a sufficient resistance was obtained. Upon the piles, cut off at a level with the bottom, was placed a grillage of heavy timber, forming the foundation for a floating caisson. This caisson was sunk to its position as the masonry part of the pier was added to its weight, the sides being kept above water until the mass was fairly settled upon the pile heads. This method, when admissable, furnishes the most economical, as well as expeditious, means of placing the masonry upon foundations under water. To prevent scour, the spaces between the piles themselves, and the space between the bottom of the grillage and river bed, are filled with rip-rap, and a bank is formed, around the outside, of the same useful material. The serviceable nature of rip-rap in resisting scour is well known, and the engineer in charge of this work has been led by his experience to place great confidence in its ability to withstand the currents of the Mississippi.

At the west abutment the rock bed of the river was found but a short distance below the surface, and the masonry was placed directly upon it. The rock, a variety of blue soap-stone, was excavated in steps, to

* See Engraving.

receive the wing walls. This abutment contains 372 yards of masonry.

The following table shows the time occupied in the construction of each pier, and the depth of water at the several points at the time of the sinking of the respective piers:

	Work commenced.	*Completed.*	*Depth of water. Feet.*
Pier No. 1 (west abutment)	Oct. 10, 1870.	May 27, 1871.	0
Pier No. 2	Oct. 10, 1870.	Nov. 13, 1870.	18
Pier No. 3 (pivot pier)		May 27, 1871.	31
Pier No 4	Dec. 13, 1870.	March 8. 1871.	22½
Pier No. 5	Jan. 8, 1871.	Feb. 4, 1871.	14
Pier No 6	Dec. 6, 1870.	March 5, 1871.	10
Pier No. 7	Nov 22, 1870.	Jan. 31, 1871.	10
Pier No. 8	March 27, 1871.	April 5, 1871.	12
Pier No. 9 (east abutment)	Feb. 15, 1871.	April 22, 1871.	5

Pier No. 2, being situated in the current of the river, required protection piles as a guard against drift. All piles were driven to the rock bed, thus demonstrating that piles could be used for the sub-foundations, by properly protecting them from scour, with rip-rap placed between and around them by divers. The average number of blows to the piles in the foundations was 112, from a hammer weighing 2,700 pounds, falling 25 feet at the last blow. A floating caisson, formed of grillage of 12-inch square oak and elm timbers, well bolted together, and carrying planked sides to above the water line, was guided in its descent by cables, which were secured to a water deadener, and side anchors, until it was settled upon the heads of the cut piles, at a depth of 18 feet below the water line of that date. The stone work consists of 496 cubic yards of masonry.

The piles of Pier No. 3, the pivot pier, were driven to the rock, and, after dredging out the sand to a sufficient depth, were protected by riprapping. A sunken crib was used as a water deadener. Much trouble was experienced from sand banks forming over the heads of the cut piles, requiring the use of divers, dredges and, finally, a water jet thrown from a steam fire-engine.

The dipping of the rock bed carried it beyond the reach of the piles for piers 4, 5, 6, 7, 8 and 9, and these piles were driven in the sand until a sufficient amount of resistance was obtained; the permanency of the sand being secured by that indispensable material, rip-rap.

At piers 8 and 9 the sand had to be dredged out to allow the wooden grillage to be placed at a sufficient depth below low water mark—the condition of durability of the wood-work being that it must *always* be covered by water, in order to exclude the air. In this situation it is practically indestructable.

The draw rests are sunk on islands of riprap and consist of strongly braced cribs presenting a sloping edge to the current. Their interior is filled with rip-rap to the top.

The bridge is approached from the west by a long curve, completing a right angle with the river and passing through a tunnel of 302 feet in length, cut through what is called lithographic limestone. The excavation was made at the east heading with Burleigh drills and powder and nitro-glycerine blasts. At the west end, by hand-work alone, a heading of full width, and some 9 feet in depth, was driven through, the top of the heading being on a line with the roof of the tunnel, the bottom was cut out afterwards. Its dimensions, after being lined throughout with brick, are 302 feet long, 20 feet high and 18 feet wide. Both entrances are ornamented with handsome cut-stone faces.

The approach at the east bank of the river is over 1¼ miles of embankment, across the river bottom land, broken at proper intervals by paved culverts and road ways, and protected by revetment walls at points subject to wash.

The following analysis has been made of the two qualities of limestone from the Hannibal quarries used in the foundations:

CONSTITUENT PARTS.	*Hannibal Brown Limestone, upper layer.*	*Hannibal White or Blue Limestone, lower layer.*
Insoluble in acids	1.295	0.390
Iron	0.64	0 453
Alumina	0.550	0.852
Carbonate of Lime	80.805	91.365
" Magnesia	14.650	2.330
Alkalies	1.060	1.120
Water	1.000	0.500
Total	100.000	99 500
Specific gravity	2 563	2 585
Weight per cubic feet	159.73	161. 0

The figures in this analysis give evidence of the comparative superiority of this limestone, as claimed by the engineer, in that it has comparatively small quantities of alumina, a small capacity of absorption and consequent density, and very great specific gravity.

As stone from the same quarry has already stood long and severe tests in some of the older buildings at Hannibal, there is no necessity for fine argument upon its chemical composition, and no reasonable doubt can be entertained of its being all that is required for the purpose.

In the foundations there were used 650,000 feet (board measure) of square timber and plank, 709 piles, and 6,270 cubic yards of rip-rap. There are 4,519 cubic yards of masonry in the piers, distributed as follows, numbering the piers from the west bank: No. 1, 372; No. 2, 496; No. 3, 1,340; No. 4, 514; No. 5, 400; No. 6, 326; No. 7, 333; No. 8, 310; No. 9, 430.

In the superstructure are 1,000 tons of iron and 280,000 feet, board measure, of timber and planks in flooring.

The cost of the bridge proper was $485,000, the tunnel on the west bank $36,000, the west approach $56,000, and the east approach $71,500—making the total cost of the structure $648,500.

SUPERSTRUCTURE.

The spans are arranged as follows: beginning at the west bank of the river, one fixed span, 250 feet long; one pivot draw-span, 362 feet long, leaving, when opened, a passage way for steamboats 160 feet clear width on each side of the draw-pier; one fixed span, 250 feet long; and four fixed spans 180 feet long each. The measurements of length are taken, in each case, from center to center of masonry, and then the total length of the bridge, from center to center of bridge-seats of abutments is 1,582 feet.

The superstructure is of the general style known as the quadrangular truss, with horizontal and parallel chords, vertical struts—except those at the ends, which are inclined over one panel—and inclined ties. In the fixed spans the upper chords and the joint pieces, etc., are of cast iron, and all the remaining parts are of wrought iron. The draw-span is of wrought iron throughout, except joint pieces and wheels, truck, etc., of the turn-table. The flooring is placed at the bottom of the bridge, and is uniformly 18 feet wide.

The general characteristics of the different lengths of spans are as follows:

	In draw-span 362 ft. long.	*In one fixed span 250 ft. long.*	*In one fixed span 180 ft. long.*
Depth of truss between center of chords } at pivot pier.	34 ft		
Depth of truss between center of chords } at ends	26 ft.	25 ft.	18 ft
Width bet. center of chords	20 ft.	19.6 ft.	19.6 ft.
Number and length of panels } 2 center panels	11.2 ft.		
Number and length of panels } 26 ordinary "	13.11 ft.	19 pan. 13 ft.	13 p. 13.7 ft.
Weight of cast iron	65 tons	50 tons.	25 tons.
Weight of wrought iron	235 tons.	125 tons.	63 tons.
Oak flooring	31 M.	22 M.	16 M.
Pine flooring	31 M.	22 M.	16 M.

STRENGTH OF BRIDGE.

The main parts of the structure are so proportioned that a moving or live load of 2,500 lbs. per lineal foot of bridge, in addition to the weight of the structure itself, and the flooring thereon (or the dead load) shall bring on no part a greater strain than one-fifth of its ultimate capacity. This general rule was applied to those parts which receive their assumed load only when the whole or a considerable part of the span may be occupied by a train of the assumed maximum weight. Those parts, such as single-panel systems, which receive their full load each time an engine may cross the bridge, are utilized to the extent of one-sixth their ultimate capacity, while the bolts supporting the floor system can never receive a load exceeding one-eighth their strength. The actual relation, therefore, between the calculated final strength of the structure and its assumed working duty is shown to be as follows, taking the 250-feet span as an instance:

Dead weight of span	240 tons.
Live load of span	310 "
Total weight and load	551 "
Ultimate strength of bridge, (factor of safety 5)	2,750 "

The dead weight, of course, remains constant under all conditions; therefore, of the gross strength of the bridge 2,510 tons is applicable to the support of the live load, which is in the ratio of more than eight to one.

In other words, when the bridge is fully loaded with its assumed maximum of 2,500 lbs. per lineal foot, it will still be capable of sustaining before fracture the imposition of an additional load of 2,200 tons.

This large excess of strength is practically still further increased, from the fact that the assumed live load of 2,500 lbs. per lineal foot can never be actually reached, even though the bridge were loaded from end to end with engines, and from the additional fact that the actual strength of the iron used is considerably in excess of that demanded by the specifications. This combination of circumstances and facts gives a reasonable assurance of abundant strength.

CONSTRUCTION.

The top chords of the fixed spans are of cast iron, octagonal in exterior section and circular within. In the 250-feet spans these chord pieces are 14 inches in diameter between the opposite exterior faces. The thickness of metal varies with the varying strains.

They are cast in lengths of one panel, the joint occurring immediately over the head of the vertical posts to which each chord-piece is bolted. The ends are widened for the reception of the post-head, the main and counter tie-rods, and the upper lateral strut and ties, all of which assemble at that point. Thus while in the 250-feet spans the chord-pieces are 14 inches wide throughout their interior length, they widen at their ends to 24 inches. This increase of width at the joints increases largely the lateral stiffness of the bridge. Where the chord-pieces abut against each other, their faces are turned off in a lathe square and true to their axes, and they are connected with each other by a tenon and socket joint.

Immediately under the joint is placed the post or vertical strut, the seat for which, on the under side of the chord, is planed to a true bearing. The post-head is of cast iron, machine-finished to correspond with its seat. The posts themselves are of rolled channel or I beams, arranged in pairs, connected together by a system of wrought-iron riveted lattice-work. The two beams thus united form a hollow, open post, rectangular in section. They range from 10 inches to 24 inches wide, varying in depth with the depth of the constituent beams. The beams extend from the post-head to a point six inches below the center of the main coupling-pin passing through their foot; the pin-seat in the post being reinforced by a cast-iron plate or washer riveted to the web of the beams. The beams of which the posts are built vary in dimensions in accordance with their duty, from channel beams of 6 inches depth weighing 10 pounds per foot, to I beams of 15 inches depth weighing 66⅔ pounds per foot.

It will be seen from this description that the posts are continuous and without transverse joint from end to end; and, furthermore, that all faces or sides of the iron of which they are built are at all times open to inspection and accessible to the paint-brush. It is considered that this is a material improvement over the closed cylindrical wrought-iron posts that are often used in similar places. Such a construction generally involves the necessity of an independent cast-iron foot or base, thus placing a full transverse joint across the body of the post; and, furthermore, the inside of these posts can never be reached either for inspection or protection, after they are once in place.

The main and counter ties are placed in piers connected at the lower end with the bottom chords and posts by a pin, and at the upper end passing through the top chord immediately over the post-head and secured in their position by nut and screw. They run diagonally, reaching from the pin at the foot of one post to the head of the second post beyond, their vertical rise being the depth of the truss and their horizontal reach being the length of two panels. They are of rolled iron, square in section, their lower part being formed into a loop, which is drilled to fit the pin; and their upper end being shaped into a cylindrical form on which the screw is cut. The end forming the screw is enlarged so that the sectional area of metal at the bottom of the screw thread is in each case larger than the sectional area of any part of the body of the bar. The nuts are faced to a true and perfect bearing on their respective seats.

The lower chords are of square iron of the length of one panel, formed with a drilled loop at each end, through which the pins pass. They vary in size and number in each panel, according to the duty demanded by their position. In their manufacture the most scrupulous care was taken to have them all of exactly uniform length between centers of pin-bearings.

The upper lateral struts are of rolled channel beams six inches deep, weighing 10 lbs. per foot, placed in pairs, between the top chords at their joints over the post-heads. The lateral ties above and below are of round iron bars one and a quarter inches in diameter.

The floor-beams consist of rolled I beams fifteen inches deep, whighing 50 lbs. per foot, suspended in pairs from the pins at foot of posts. The bolts suspending the floor-beams and the coupling-pins are forged bodily from selected scrap, under heavy hammers, and afterwards machine-finished for their respective positions.

The above description of the parts of the fixed spans applies equally to the draw-span, except that in that span the chords are necessarily different, as is demanded by the varying nature of the strains, which change from compressive to tensile, or the reverse, as the draw is open or shut.

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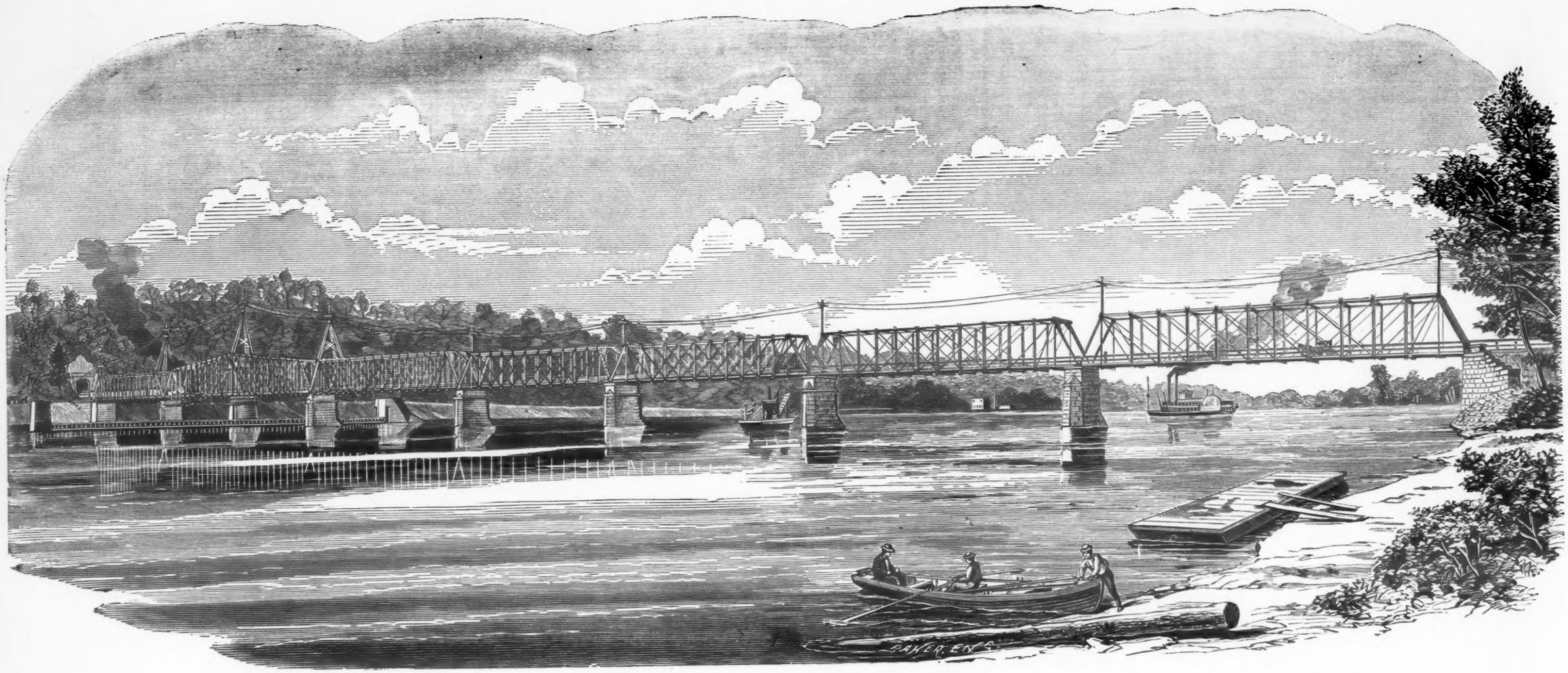

RAILROAD AND HIGHWAY BRIDGE OVER THE MISSISSIPPI RIVER, AT HANNIBAL, MO.

E. D. MASON, Engineer.

They are built of channel beams 12 inches deep, 33⅓ lbs. per foot, placed in pairs, and connected together with plate iron, thus making generally a trough or hollow box of three sides, 24 inches wide and about 12 inches deep. The joints, which are carefully broken, are spliced with appropriate cover-plates, and the whole thoroughly riveted together.

The top and bottom chords are substantially similar, varying in dimensions, etc., only with the varying duty. The turn-table on which the draw-span revolves consists of a rectangular hollow girder or drum, 18 inches wide, and 4½ feet deep, curved to a circle, with an exterior diameter of 37½ feet. The sides of this drum are of plate iron, and the top and bottom are of cast iron, and are separated by thirty cast-iron stiffeners, or diaphragms, carefully fitted to which, and to the top and bottom segments, the side plates are thoroughly riveted. This circular drum revolves upon forty-eight heavy cast-iron wheels or rollers, placed under it, and they in their turn rest upon a cast-iron track bolted to the masonry of the pier. These wheels are connected with each other and with the center step by bands and radial axles. The wheels and the upper and lower track bearings are chilled to great hardness to resist wear. From the bottom of the revolving drum pass truss-rods, the upper ends of which bear upon a heavy central cast washer, at the bottom of which is the pivot-pin, of wrought iron, 8 inches in diameter. This pivot-pin turns upon a gun-metal bearing in the top of a central conical block of cast iron, which is fastened to the masonry.

The adjustment of the load between the exterior wheels and the central pivot is made by means of the truss-rods above mentioned.

The ends of the draw are secured in their position on the piers by means of a system of cams, so arranged with screw and connecting rods as, when being run down, to absolutely lift the ends of the bridge. This device is essential, as otherwise, when a train might be entering upon one end of the draw, one wing being thus loaded and the other wing being empty, the unloaded end would rise from its bearings, and thus serious and complex strains be induced upon parts of the structure.

But by absolutely and sufficiently lifting the ends of the bridge upon solid bearings this difficulty is entirely avoided, and the structure can thus be treated legitimately and correctly as a beam resting upon three points of support, and the complexity of the problem of strains be immensely simplified.

The bridge is turned and the machinery of the end cams operated by a double engine of about twenty horse power (nominal) placed on an iron platform laid for the purpose on beams supported by the main posts over the turn-table. This platform or floor is placed at a sufficient height above the lower chords to allow the passage of trains beneath it.

QUALITY OF MATERIALS.

Samples of all the wrought-iron bars used in the bridge were tested to their ultimate capacity before acceptance.

The tensile strength ranged from 55,000 to 65,000 lbs. per square inch of sectional area, and the lowest limit of permanent set was about 2,500 lbs. per square inch.

The stretch before final rupture was about twenty per cent. of the length of the original bar, and the diminution of area proportional therewith.

The cast iron was from a mixture of seventy-five per cent. of No. 1 Lake Superior charcoal pig, with twenty-five per cent. of Scotch pig of the brand known as "Calder iron."

Test pieces were cast two inches deep, one inch wide and forty inches long. These were placed edgewise upon bearings thirty-six inches apart and were called upon to sustain the transverse strain from a load of 2,800 lbs. placed at the center.

All the test pieces showed higher capacity. The hollow chord pieces were drilled and accurately callipered for thickness.

After manufacture and before being placed in the bridge, each piece of bar iron was placed in the testing machine, and subjected to an actual tensile strain of of 15,000 pounds per square inch of sectional area, and while under such actual strain, received several sharp blows from a hammer. Any imperfection or weakness detected by this treatment condemned the bar. Of the many hundreds of bars thus treated, only two exhibited any sign of failure, and in both these instances the defect was in the original bar, and not in any part that had been worked at the shops. As soon as finished, and before leaving the works, every piece received one coat of paint, composed of oxide of iron and oil.

All the iron work was done at the shops of the Detroit Bridge and Iron Works, at Detroit, and having been fitted together there, each piece was marked, so that when brought to the place of final erection every part went to its place with perfect accuracy.

FLOORING.

Upon the iron floor-beams are laid pine stringers, placed longitudinally. Under each rail in the track are two pieces, 7x16 inches, and in addition thereto are four parallel pieces, 6x14 inches. All these are laid upon small oak bolsters, which rest upon the iron beam. On the top of the stringers are oak ties, 6x8 inches, spaced about 20 inches apart, between centres, reaching entirely across the bridge. A double course of 2-inch oak flooring-plank forms the roadway, the track for engines and cars being of the pattern known as street rail, the top of which is flush with the top of the oak flooring. A substantial oak wheel-guard, and a strong neat hand-rail form the side protection.

PAINTING.

The entire superstructure received, after erection, two thorough coats of paint. For the main trusses the paint was of strictly pure white lead, tinted to a light drab, while the floor-beams, track-stringers and hand-rail were covered with iron-paint of a dark brown shade.

THE CHICAGO, BURLINGTON & QUINCY REPORT.

We give elsewhere a summary of the annual report of this company, whose great system of lines forms one of the handsomest properties of the country—the roads running through the finest agricultural country in the nation, and kept in the best of order and most fully and excellently equipped. The details given in the report leave few calculations to be made by the reader. The most striking feature—and one seen quite generally in railroad reports this year—is that the increase in receipts has been not nearly so great as the increase in traffic, and the increase in traffic hardly so great as the increase in mileage, notwithstanding the fact of the unusually small earnings of 1869-70 from corn—one of the principal articles of freight—owing to a general failure of that crop in 1869, and the general increase in population and productions on the company's lines and the country with which they connect. The increase in the average length of road operated in 1871 over 1870 was about 110 miles, or about 20⅔ per cent. The increase in freight business has been nearly or quite as much, perhaps; but the increase in passenger traffic cannot be so large. The increase in receipts, however, has been but 8¾ per cent. in the aggregate, and only two-thirds of one per cent. from passenger traffic, the considerable increase in business being nearly neutralized by a considerable reduction of rates, especially on certain kinds of through business, which have always brought a considerable revenue to this company.

These phenomena are very satisfactorily explained in President Joy's report, by the increase in competition consequent on the construction of new railroads, all of which get some business which otherwise would go to the older lines, and some of which accept almost any rate in order to secure business. Under these circumstances, and considering that the new branhes are, however good, inferior in natural carrying capacity to the great part of the old ones, and that their traffic is hardly developed as yet—under these circumstances, we say, the company is to be congratulated for having earned so much. The effect of the opening of new roads is likely to be felt more in the future than in the past, unless some of the projected lines shall come to grief, but they are likely to effect it more by reducing rates than by diverting business, for in few places can they offer more favorable routes. Very wisely does Mr. Joy say: "It is not, however, "possible to avoid competition, and this will gradually "become, in the West as in the East, more and more "intense, and the various roads will be compelled to "rely upon the advantages of location and route, make "their tracks as perfect and permanent as possible, by "steel rails, and rely upon the volume of business and "the economy with which it may be done, for profits."

Notwithstanding the large proportion of branch roads in this property, they forming considerable more than one-half of its mileage, the earnings for the year reported amount to $11,227 per mile of road. However much the average local earnings may be affected by the construction of new and competing lines and the addition of new branches with comparatively light traffic (perhaps very profitable, however, because costing little), the increase in the through business is likely to counter-balance and over-balance it, for this company's connections are numerous, run through rich and rapidly-growing sections, and are sure to give the largest part of their through traffic to this road.

This is probably the last report we shall have from Mr. Joy as President of this company. He has held that position for six years, succeeding John Van Nortwick, of Batavia, Ill., in 1865, during which time the company has been most prosperous, its lines having increased from 400 to 758 miles, and its earnings from $5,582,000 to $7,208,000.

Scalping the Scalpers.

The representatives of the various lines leading eastward and northward from St. Louis have united in publishing a circular in which they announce that they have pledged themselves "not to permit any person "selling our tickets in outside or commission offices in "St. Louis to make any reduction in any way from the "regular schedule rates, or to pay, cause to be paid, or "allow to be paid in *any way*, any drawback, commis-"sion, rebate or allowance, or in any way, directly or "indirectly, to reduce the regular schedule rate on pas-"senger tickets, or to arrange in any way by which a "reduction is made or allowed on the same. The vio-"lation of the above agreement in any one case will "carry with it the withdrawal of all the tickets placed "in your hands by all of the undersigned."

The ticket agents of the Union and the Kansas Pacific roads have also united in a circular in which they announce that after the first inst. they cease to pay any commissions on ticket sales over their lines.

It may seem strange that any effort should be necessary to secure and maintain an agreement not to spend money for the sake of stealing business from each other, but such is the case. A rigid adherence to the policy laid down above will save large amounts to the companies; but the defection of a single party suffices to break it up, and, therefore, when there are many parties, such an agreement is rarely long maintained.

The Navigable Waters of Illinois.

Few have any adequate idea of the extent of the navigable waters in and around Illinois. We estimate that the steamboat routes of the State are one-fourth as long as the railroad lines, and these navigable waters have had much to do with the prospects and rapid growth of the State.

There are in and on the boundaries of Illinois the following routes of navigable streams on which steamboats run:

	Miles.
Mississippi River, Cairo to Dunleith	679
Ohio River, Cairo to mouth of Wabash	118
Illinois River, mouth to La Salle	324
Total	1,120

Besides, the Wabash, on the southeast boundary, is navigable for about 180 miles of its crooked course, and there is about 70 miles of the coast of Lake Michigan on our northeast border. There are or have been steamboats on the Fox and Rock rivers, though they can hardly be called navigable, and these steamers have run somewhere on their upper courses, above many dams which cut them off from their mouths. The Kaskaskia, also, we believe, has been navigated by steamboats, and the raging canal bears canal boats from Bridgeport to La Salle, 96 miles. The plans for the improvement of the Kankakee and Illinois rivers, if carried out, will add about a 100 miles to the sum given above.

Correction.

Our article on narrow-gauge roads in last week's paper contains two errors, one editorial the other typographic. We stated that a leading Western paper made the assertion that the cost of building and equipping railroads is in proportion to the cube of their gauge. We should have said the *cube-root* of their gauge. This of course entirely changes the estimate of their relative cost and is very different from our statement.

The other error is an omission of two entire lines, which makes what we wrote almost meaningless. The lines given below in italics were entirely omitted from the following sentences:

"As near as we can calculate from the engraving, the weight of the axles for the 3-feet gauge is 150 pounds. *If each of them is made 50 per cent. heavier for the wide gauge car the increase will amount to 150 lbs.*, or a fraction over 4 per cent. of the weight of the car empty, or *one per cent.* of its weight when loaded. It will be observed that we have not taken in o consideration the weight of the locomotives, which, if added to the weight of the cars, would make the increased weight of axles considerably *less than one per cent.* of the total weight of train."

—It is reported that Thomas A. Scott, President of the Pennsylvania Company, of the Union Pacific Railroad Company, and First Vice President of Pennsylvania Railroad Company, etc., is seriously ill.

—James A. Edwards, Treasurer of the Louisville & Shelbyville Railroad Company, and a prominent banker of Shelbyville, was run over by a train and killed at Shelbyville Junction, on July 8.

NEW PUBLICATIONS.

The Roadmaster's Assistant and Section-master's Guide.—This little book will hardly need an introduction to our readers when we tell them that it contains the substance of the articles contributed by Mr. William S. Huntington to the RAILROAD GAZETTE, and published in our columns in the first quarto volume chiefly. These papers met with very general approval, and rarely has any matter on a technical subject been so generally read *and understood* by men unfamiliar with the subject. Mr. Huntington brought rare qualifications to his work. Not only has he had wide experience and complete familiarity with the work of track-laying and track and road-bed repairing, *and with the men who do the work*, but he has what a Yankee would call the "knack" of describing the processes to be followed and the precautions to be observed in a most vivid and entertaining manner. Therefore, we find that in this book he has not only told us how work should be done—and that is much—but has also pointed out the mistakes and omissions which track-men are likely to make, has given his information in a style perfectly intelligible to any man who can read English at all, and, we might almost say, entertaining to all who read English; for there is a certain humor in his style which pleasantly flavors what we might naturally suppose would be the dryest of treatises.

Mr. Huntington's practical sense is nowhere more evident than in the minuteness of his directions. He leaves nothing to be inferred, but explains every step in every process. The materials are put before your eyes, the tools are put in your hands, you are told how to hold and how to strike, and when you have read the chapter you feel as if you had done the work.

Such a work, giving instructions concerning subjects which heretofore have scarcely been mentioned in engineering works, addressed not primarily to engineers, but to engineers' subordinates, and adapted to their understanding, ought to be of great value. Certainly, if its precepts were followed, there would be a notable improvement in expense accounts, and in the safety of our railroads. It ought to become an indispensable part of the outfit of every track and section-master.

The Northwestern Shippers' Assistant.—Under this title Messrs. T. A. Hungerford & Co., of Chicago, have published a handsome volume of 670 large octavo pages, which purports to give "full directions for shipping, expressing, telegraph-"ing and collecting in Illinois, Indiana, Iowa, Michigan, Wis-"consin, Missouri, Minnesota, Kansas, Nebraska, Dakota, "Montana, Idaho, Nevada, Colorado, Wyoming, Utah, New "Mexico, Washington Territory and Indian Territory."

The great body of the book—533 pages, is taken up with the "directions for shipping, expressing and telegraphing." It is a list of places alphabetically arranged, beginning on page 61 of the book with "Abbles," and closing on page 593 with "Zwingle." It is intended that the directions given with the name of each place shall be sufficient to direct those who wish to send a package or telegram to it without any further reference. For instance, take the first place on the list. It reads:

ABBLES (L)—ILL.—Jersey Co. C., A. & St. L. R. R. to Jerseyville, or C., R. I. & P. R. R. to La Salle, thence by Boat on Illinois River. U. S. Ex. W. U. Tel. to Jerseyville.

Now in this there is probably but a single abbreviation or sign which most Chicago readers would not understand without explanation, and that is the "(L)" which follows the name immediately and which reference to the explanations of abbreviations shows to mean that it is the local name of the town and not of the post-office, while all towns without the sign are post-offices.

Besides these directions, the book has a "collection department," in which is given a list of banks and bankers in nineteen States and Territories, with the amount of capital and name of cashier of each. In this list the counties are arranged alphabetically, and when there is no bank in the county named the location of the nearest bank is given.

Another feature is a table of distances to the principal places in the Territories with the most direct wagon routes to them from railroad stations and river landings. Still more interesting is a table of river distances on the Mississippi from Cairo to St. Paul; the Missouri from St. Louis to Fort Benton; the Illinois from its mouth, 19 miles above St. Louis, to Ottawa; the Ohio from Cairo to Lawrenceburg, Ind.; the Des Moines from Keokuk to Des Moines; the Minnesota from St. Paul to Yellow Medicine; the St. Croix from Prescott to St. Croix Falls, and the Illinois & Michigan Canal from Bridgeport to Ottawa; also, a "transportation table," which gives the lines of steamers running on lakes Michigan and Superior from Chicago, with the distances from Chicago of the chief places at which they touch.

It is easy to understand that such information is of the highest value to shippers. It is evidently carefully prepared, and though nothing but actual use for a considerable time will suffice to demonstrate its accuracy, the marks of carefulness and thoroughness are so plain, in the work, as to give us unusual confidence in it.

—A suit has been brought by the Hannibal & St. Joseph Railroad Company, in Marion County, Mo., against John Stephens, laying damages at $10,000, for destruction of property caused by stock of Stephens' throwing a train of cars off the track, mashing them up. The company claim that they have a lawful fence to protect their road against stock of any kind, and, therefore, Stephens should be held responsible for damages done by his stock, which got on the track through the carelessness of defendant. The case excites considerable attention since suits generally come from the other side for damages when stock of any kind is killed by trains.

CHICAGO, BURLINGTON & QUINCY RAILROAD.

Report for the Year Ending April 30, 1871.

We give herewith some statistics from the Superintendent's report and the greater part of the President's report.

The statistics of receipts, expenses and mileage are given as follows in the Superintendent's report:

A comparison of the statistics of the year ending April 30, 1871, with those of the preceding year, shows as follows:

Earnings from	1870.	1871.	*Increase.*	*Decrease.*
Passengers	$1,718,323 38	$1,730,304 02	$11,980 64	.....
Freight	4,514,629 24	4,949,684 44	435,055 20	.....
Miscellaneous	388,820 50	527,696 74	138,876 24	.....
Total	$6,621,773 12	$7,207,685 20	$585,912 08	.....

Expenses.	1870.	1871.
Exclusive of taxes	$3,754,555 36	$4,202,977 76
Taxes	235,213 03	225,696 67
Total	$3,989,768 39	$4,428,674 43

Ratio of Expenses to Earnings.	1870.	1871.
Exclusive of taxes	56.70 per cent.	58 31 per cent.
Inclusive of taxes	60.27 " "	61.35 " "

	Miles.
There was in operation at the beginning of the year	603¼
Added during year:	
From	
Carthage to Quincy (opened December 25, 1870)	39¾
Streator to Fox River Junction (opened Jan. 15, 1871)	57½
Keithsburg Junction to Keithsburg (opened Jan. 15, 1871)	5¾
Total	706

In addition to the foregoing, there were built, but not opened for business until after April 30, 1871:

	Miles.
West Aurora to Geneva (opened May 1, '71)	10
Mendota to Prophetstown (opened May 14, '71)	45¼
Total	55¼
Average length of road in operation during year ending April 30, 1871	642
Average length of road in operation during year ending April 30, 1870	532¾
Increase	109¾

From the President's report we take the following:

The expenses have been about one per cent. in excess of the former year, and this year, exclusive of taxes, have been 58.31 per cent., and including taxes, 61.35 per cent. of the gross earnings.

It will be seen that the ratio of the expenses to earnings have increased within the last three or four years, from about 53 or 54 per cent., to 61 per cent. of the gross revenues.

This is occasioned by the increased competition for business, having the effect to reduce rates, resulting from the construction of new roads, in which Illinois has been very prolific within the past few years, and which has been the natural result of the legislation of that State, allowing its municipal corporations to incur large debts to aid in their construction.

It has not been unusual for towns through which a projected road might be planned, to vote from $6,000 to $10,000 per mile to aid in building such projected roads, and often as a bonus! And this has been done even when there have been railroads in close proximity.

Of course there have been many roads built which will be of little value in themselves, and of no sufficient value to the towns through which they run, to compensate for their cost. The system was a vicious one, and dangerous to the credit of the State, and has been not too early brought to an end by the prohibition contained in the new constitution, adopted during the past year.

The volume of all classes of business, taken together, has been largely increased, and on both local and through freights, the increase in tonnage is quite 20 per cent in the aggregate.

The additional revenues, as has been stated, amounted to only $585,912.08, or not quite one-twelfth of the gross receipts of the previous year, while the reduced charges on the much larger volume of business of course enhance the proportionate cost of transacting the business. While on the whole, therefore, the amount of the business done shows a satisfactory increase in volume, the profits have not kept pace with the increase of the business.

There is, however, still another reason which may be given for the increased proportion of costs to earnings, which is that three new tribu ary lines have been brought into existence during the past year, and one or two others had but just opened as the year began, and the business on them—which is new—has not yet become developed.

The cost of doing business on these new roads must, of course, for a time, be much larger in proportion than on the main line, where the volume is so many fold larger. This cause will cease to operate as the business on these shall, as it will, rapidly increase in amount.

Of the very large items of business, it may be stated that the number of cattle transported over the road has increased from 116,882 head in 1869, to 208,102 in 1870, being an increase of 91,220 in a single year.

The traffic in hogs was about the same as the year before, being 554,413.

The traffic in lumber, always large, has increased 20 per cent.

In corn, also always large, the increase has been considerable, though in that article an increase or 30,600,000 of pounds is not to be considered a large increase.

The increase of the gross earnings has been as stated	$585,912 08
And in operating expenses the increase has been	438,906 04
Leaving increase of net earnings of for the present year over the past.	$147,006 04

The whole net earnings of the year over operating expenses of all kinds, including taxes and of interest on the bonds of the company, has been $14.54 per share.

While the local traffic of the road has been fairly maintained, the through business is rapidly increasing in volume, although done, for the most part, under sharp connection with the other lines.

The earnings on your road, for instance, from passengers to and from the Hannibal & St. Joseph Railroad, have been	$299,557 76
From freight	1,007,957 63
Total	$1,307,515 39
The earnings of your road, from passengers to and from the Burlington & Missouri River road, have been	$195,217 74
From freight	654,613 04
Total	$849,830 78

It will be seen that the business exchanged with the Hannibal & St. Joseph has increased upwards of $300,000 in the year, and that with the Burlington & Missouri has increased upwards of $400,000.

This is an indication of the increase of population and business in those sections of country tributary to those roads, as well as to that of this company. Though this business is, much of it, done at rates determined by competition, and therefore at very low rates by your company, still much of it is done at fair rates, and, on the whole, the business is of great value to this company.

The several roads which now constitute the tributary branches of your road have been aided by this company, not so much on account of their intrinsic value, as because, under the liberal laws of Illinois, allowing towns and municipal corporations to aid in constructing railroads, and with the anxiety of the country along their lines to have the roads, such inducements were offered as were sure to insure their construction, and the board has deemed it safest to lend the helping hand and make them tributary to your road, rather than leave the communities to seek alliances with other companies, and carry business, which could best be done by your road, to other avenues of trade.

About one-half of these tributary roads have been in operation more than one year, and the earnings derived from the business of these is much more than adequate to paying the interest on the cost to this company.

The Quincy & Warsaw road, Ottawa, Oswego & Fox River Valley, the Illinois Grand Trunk (Prophetstown), are but just opened, and, as yet, nothing can be said as to actual earnings, but it is believed that they will become equally valuable as tributaries to the others, while all will increase in value much beyond what they now appear to be worth.

The revenues of this company derived from the business furnished by the American Central road was, last year	$208,824 11
From the Keokuk & St. Paul	349,217 42
" Dixon, Peoria & Hannibal	165,010 39
" Carthage & Burlington	97,309 74
Total	$821,362 66

Even these roads do not at present show what they will be worth to this company by their earnings. The oldest is but recently opened, and the business of the country is hardly yet accustomed to them. We think it safe to say that those opened the past year will be, perhaps, of more value than these.

The very large traffic now passing over the main trunk lines of the company, between Quincy and Burlington, and Chicago, is so heavy that the iron rail has been found inadequate to the business, and gives way rapidly under its weight. The expenses of maintenance of way, therefore, so far as the main lines are concerned, have become very great. Upwards of 78 miles out of 302 have been taken up and relaid during the past year, and it is quite likely, with the increased traffic, the rail iron will not last three years in the future.

The test of steel has now been so thoroughly tried by this company, as well as many others, that all doubts of its value have been removed, and the board have determined to lay no more iron in the main trunk lines of the road, and in future all repairs of those lines so far as the track is concerned, will be by putting down steel instead of iron rail.

We think that the average life of the steel rail is at least ten times that of iron, and so far as the experiment of this company is concerned, it proves that this estimate is considerably within bounds.

Economy therefore demands that the whole main lines be laid with steel as fast as the iron gives way, though steel is much more expensive in the first instance.

The increased business, and the added number of miles of road operated by the company, have required increased power and rolling stock.

There have been put upon the road during the year, 22 locomotives, making the number now belonging to the company 175 in all.

There have been added to the rolling stock, 5 passenger cars, 9 new baggage, mail and express cars, 95 platform and coal cars.

The present equipment in cars consists of 69 passenger cars, 45 baggage, mail and express cars, 2,148 house, freight and cattle cars, 791 platform and coal cars, besides other cars for drovers, etc., and maintenance of way, used and necessary for repairs, etc.

The capital stock of the company now stands at	$16,590,510 00
The bonded debt of the company, bearing interest, is	4,316,000 00
Scrip issued to pay for Northern Cross road from Galesburg to Quincy, not bearing interest	239,250 00
	$21,145,760 00
Amount due to bond-holders of Northern Cross, on foreclosure and sale of the road	256,206 95
Total	$21,401,966 95

In addition to this cost of the Chicago, Burlington & Quincy Railroad Company proper, are contingent liabilities for the bonds of the branch railroad companies, amounting to $6,758,002.

It will be seen that these various roads have cost this company considerably more than the amount of bonds upon them.

There has been expended at Burlington, in past years, upon grounds owned by the Burlington & Missouri Railroad Company, in the Mississippi, in filling them up, $303,631 50, which is due from that company, having been advanced with an agreement that it should be repaid by deeding a portion of the land made by it, and such money adjustment as might be found just and fair for the balance.

The construction of the Rockford, Rock Island & St. Louis road, extending from St. Louis northward to Sterling, on the Chicago & Northwestern Railroad, and of a road from Peoria to Rock Island, while they will not very greatly affect the amount of business of this company, will, as newly constructed roads in the same territory always do, considerably affect prices at which business will be done. The fact that they may not be profitable roads, and will do business under great disadvantages, and must compete against more natural and easy channels for business, only render more certain the effect upon rates. It is not, however, possible to avoid competition, and this will gradually become, in the West, as in the East, more and more intense, and the various roads will be compelled to rely upon the advantages of location and route, make their tracks as perfect and permanent as possible, by steel rails, and rely upon the volume of business and the economy with which it may be done, for profits.

It is believed that the road of your company is so located, and draws its business and revenues from so large an extent of country, and presents such direct and easy routes to and from great centers of business, that it may apprehend as little from the increasing competition as any of the Western railroads.

Kellogg Bridge Company.

The Kellogg Bridge Company, of Buffalo, N. Y., has received orders from the Erie Railway Company for the construction of a wrought-iron, double-track railroad bridge of five spans over the Delaware River near Port Jervis.

General Railroad News.

CHICAGO RAILROAD NEWS.

Illinois Central.

The company has declared a semi-annual dividend of 5 per cent., payable in currency on the 1st of August. The last dividend was made payable in gold, and some of the English stockholders have ventured a complaint because that example was not followed. The transfer books will be closed from the 15th of July until the 5th of August.

Poor's Railroad Manual.

Mr. I. D. Marks, the agent for Poor's Manual of the Railroads of the United States, will be in Chicago next week—probably Monday—to deliver copies to subscribers and purchasers. All orders sent to him at the office of the RAILROAD GAZETTE will be attended to.

Chicago, Rock Island & Pacific.

The President last Monday addressed the following notice to the New York Stock Exchange:

"In accordance with the rules of the New York Stock Exchange you are hereby notified that after thirty days this company will issue twenty thousand (20,000) shares of additional capital stock. The proceeds of such additional shares are required to furnish additional equipment to enable this company to operate the Chicago & Southwestern Railway, now nearly completed, and to extend the Washington Branch of this company's road to the town of Sigourney, Iowa, some thirty miles, and for other purposes."

The Chicago & Southwestern Railway will be about 250 miles long, and an allowance of only $5,000 per mile for rolling stock will absorb $1,2 0,000, while the new branch may cost half as much more.

ELECTIONS AND APPOINTMENTS.

—The following were chosen directors of the Des Moines Valley Railroad Company, at the recent election: D. W. Kilbourne, Wm. Leighton, C. H. Perry, H. T. Reid, E. P. James, N. A. Cowdrey, David Crawford, Jr., A. G. Agnew, Geo. E. Kilbourne, Smith Hamill, Geo. B. Smyth. D. W. Kilbourne was chosen President; C. H. Perry, Vice-President, and A. Bridgman, Secretary. All these are re-elections, with the exception of A. G. Agnew, chosen in place of James F. Cox.

—The following is the recently-elected Board of Directors of the Wellington, Grey & Bruce (Canada) Railway Company: Wm. McGiverin, President; G. D. Ferguson, Vice-President; D. McInnes, John Ferrie, John Stuart, James Stewart, A. T. Wood, A. Sproat, M. P., Jas. Turner, James M. Fraser and James Wilson, and *ex-officio* D. B. Chisholm, Esq., Mayor of Hamilton.

—James F. Joy has been elected President, Oliver Macey Treasurer, and C. M. Davidson, Secretary, of the Detroit River Tunnel Company.

—John I. Blair has resigned the Presidency of the Cedar Rapids & Missouri River and Iowa Falls & Sioux City railroads.

—Some errors were made in the report of the election of directors of the New York Central & Hudson River Railroad Company telegraphed by the Associated Press and published generally throughout the country. The following are the names of the directors elected: Cornelius Vanderbilt, William H. Vanderbilt, Horace F. Clark, Augustus Schell, James H. Banker, Samuel F. Barger, William A Kissam, H. Henry Baxter and Joseph Harker, all of New York city; Henry R. Pierson, Albany, N. Y.; Chester W. Chapin, Springfield, Mass.; George J. Whitney, Rochester, N. Y., and James M. Marvin, Saratoga Springs, N. Y. The only change in the board from last year is the substitution of Henry R. Pierson for Samuel Barton.

—The new Board of Directors of the Chicago, Burlington & Quincy Railroad Company have organized by the election of the following officers: James M. Walker, Chicago, President; John N. Denison, Boston, Chairman of the Board; Robert Harris, Chicago, General Superintendent; Amos T. Hall, Chicago, Treasurer and Secretary. Mr. Walker, the new President, succeeds James F. Joy, of Detroit, who has been for many years the President of the company, but declined a re-election. Mr. Walker, his successor, was formerly the law partner of Mr. Joy, and has been for many years the Attorney of the road of which he is now President. He has, indeed, long performed many important executive duties for the company, and for those which it has intimate connections west of the Mississippi, and is therefore thoroughly familiar with the duties of his office. He was lately a member of the law firm of Walker & Dexter, and has a wide reputation as a clear-headed lawyer and a sagacious manager. The other officers of the company were re-elected.

—P. S. O'Rourke, formerly Master of Transportation of the Pittsburgh, Fort Wayne & Chicago Railway, has accepted an appointment as Assistant Superintendent of the Michigan Lake Shore Railroad (Allegan to Muskegon, *via* Holland & Grand Haven).

—Mr. Charles B. Daly, heretofore employed as Assistant Engineer on the Lake Shore & Michigan Southern Railway, has accepted the appointment of Chief Engineer of the Chicago & Canada Southern Railway.

—The Manhattan & Northwestern Railroad Company has been organized at Manhattan, Kansas, to build a road from Manhattan, through Riley and Marshall counties, to Irving. The officers are: G. W. Higginbotham, of Manhattan, President; W. J. Williams, of Irving, Vice-President; L. R. Elliott, of Manhattan Secretary; E. B. Purcell, of Manhattan, Treasurer.

—An Alabama paper says: "The Selma & Meridian Railroad, in changing hands, has also changed its name. It is now the Alabama Central Railroad—a much better name. The officers elect of the new management are: President, C. N. Jordan, of New York; Treasurer, Major W. L. Lanier; General Superintendent, Captain Charles B. Wallace; General Freight and Ticket Agent, John M. Bridges."

—James Charlton, late General Ticket Agent of the North Missouri Railroad, has accepted the appointment of General Ticket Agent of the Chicago & Alton Railroad and arrived in Chicago to enter upon his duties on the 13th inst.

—E. A. Ford, General Passenger Agent of the Missouri Pacific and the Atlantic & Pacific railroads, announces the following appointments: I. G. Wheeler, Northern Passenger Agent, Buffalo, N. Y.; J. G. Hill, Eastern Passenger Agent, Columbus, O.; J. F. Thompson, Southern Passenger Agent, Atlanta, Ga.

—F. A. Follett has been appointed General Ticket Agent of the Ohio & Mississippi Railroad, in place of Charles E. Follett, resigned, and W. B. Hale, late General Ticket Agent of the Missouri Pacific, has been appointed General Passenger Agent. A circular from A. N. Chrystie, Vice-President, says: "All business relating to ticket rates, division reports to and from foreign roads, etc., will be transacted through Mr. Follett. Business relating to advertising, commissions, outside agencies, etc., will be transacted through Mr. Hale, and all business communications referring to these departments should be addressed to the above named respectively, at St. Louis, Mo."

OLD AND NEW ROADS.

Gilman, Clinton & Springfield.

This road is now finished between Gilman and Clinton, about 16 miles, and a force of 300 men are laying track towards Springfield at the rate of one mile a day. The bonds, to be issued when the road was finished through Bell and Homer townships, amounting to $30,000, and $42,500 from Drummond Grove Township, Ford County, have been sent to the Auditor of Illinois to be registered.

Portland, Rutland, Oswego & Chicago.

There is to be a great meeting in favor of this line in Portland on the 26th inst., at which "Senator Hamlin will make an exposition of his great railroad bill to secure cheap transportation of breadstuffs and provisions from the West to the seaboard at uniform prices throughout the year."

Wellington, Grey & Bruce.

This Canada railroad was opened from Guelph, at the junction of the Grand Trunk with the Guelph Branch of the Great Western, northwestward 23½ miles to Alma during last year. Work on the extension of the road in the same general direction through Drayton to Harriston is progressing, and it is likely to be completed early next November. Another section, from Harriston north by west to Southampton, on Lake Huron nearly opposite Saginaw Bay, has been let and will probably be completed before the end of next year.

Sioux City & St. Paul.

Graders on this road have worked down into Iowa, and were expected at Le Mars, Plymouth County, where the line will join the Dubuque & Sioux City road, this week. The latter road will furnish the former an entrance into Sioux City over the 23 miles below Le Mars.

Boston & Maine.

The injunction case of the Boston & Maine Railroad *vs.* The Portland, Saco & Portsmouth Railroad, has been decided in favor of the Boston & Maine. This, we suppose, will compel the former to haul the trains of the Boston & Maine into Portland, as well as those of the Eastern road.

St. Louis, Council Bluffs & Omaha.

Last week the completed section of this road between Chillicothe and Pattonsburg, about 37 miles, was turned over to the North Missouri Company, which is running regular trains from Brunswick to Pattonsburg.

Northern Pacific.

A newspaper in Washington Territory reports the wages of a two-horse team and driver, on that end of the road, as $5 per day in currency, the driver boarding himself and team.

The Cincinnati Railroad Tunnel.

A telegram from Cincinnati dated July 10 says: "Information received to day confirms the report of an arrangement being completed to finish the great tunnel commenced years ago through the hills north of the city, for a railroad entrance. A. J. Hodder, President of the old company, arrived to-day, and reports the arrangements completed with Eastern capitalists, and contracts entered into for the immediate commencement of the work. Among those interested are said to be John C. Fremont and General Moulton, of New York. About two-fifths of the work to the tunnel was done at the suspension of operations, and it is estimated that $50 000 will remove all obstructions that have accumulated since that time. The knowing ones say that, in addition to accommodating the Chesapeake & Ohio Railroad, the object is to provide an entrance to the city for the Cincinnati & Mackinaw Railroad, the completion of which to this city is believed not distant."

Ohio & Mississippi.

This company is having 150 freight cars built—100 by the Ohio Falls Car Company, and 50 by Cill & Co., of Columbus, Ohio.

Long Island Railroad.

The Rockaway Branch of this road, from Willow Tree Station, 11 miles east of the terminus at Hunter's Point, southward to Rockaway, is to be opened about the 1st of August.

Osage Valley.

The road bed of this line will be completed about the first of next month from Tipton, the junction of the Missouri Pacific with the Boonville Branch, southward 18 miles to Versailles.

Western Maryland.

The extension of this road will probably be completed to Sabillasville, where it will cross the South Mountain, before the 1st of August.

Holyoke & Westfield.

This road is to extend from Westfield, Mass., ten miles west of Springfield, on the Boston & Albany Railroad, northwest to Holyoke, about ten miles.

Raleigh & Gaston.

The directors of the Raleigh & Gaston Railroad, N. C., have issued a second circular to their stockholders, supplementary to the first, in which they submitted a proposition on behalf of a party not named to purchase one-half of the capital stock of the company, (7,500 shares at $45 per share), ex the July dividend. The present circular names as the party making the offer Mr. W. T. Sutherlin, of Danville, a director of the Richmond & Danville Railroad Company, on behalf of associates, who are unknown to the directors of the Raleigh & Gaston Company.

Kankakee River Improvement.

This work is progressing under the charge of the Kankakee Company. At Wilmington a race 4,000 feet long and 100 feet wide is nearly finished, and work has been commenced on the grand locks there. It is reported that the work done the present season will cost not less than $200,000.

Northern & Southern of Georgia.

At Rome, Ga., July 8, at the city election to decide whether Rome should subscribe $10 ,000 to the Northern & Southern Railroad from Rome to Columbus, Ga., the vote was unanimously in favor of the subscription. The distance is about 125 miles.

Chartiers Valley.

This railroad, projected many years ago, is just completed. It extends from Mansfield, on the Panhandle line, 12 miles west of Pittsburgh, southwest 26 miles to Washington, Pa., on the Hempfield Railroad 32 miles east of Wheeling. In connection with the latter line it forms a new and short line between Pittsburgh and Wheeling; but as the Pennsylvania Company controls the Chartiers Valley, and the Baltimore & Ohio the Hempfield, it is not likely that there will be any great amount of "through" business on the new lines, especially as the Pennsylvania through Panhandle and the River Division of the Cleveland & Pittsburgh controls entirely a line between Pittsburg and Bridgeport, opposite Wheeling, only 65 miles long, while the new route is 70 miles long.

Smyrna & Delaware.

This road extending from Smyrna, Del., 39 miles south of Wilmington, eastward to the Delaware Bay, about seven miles, is under contract to Charles H. Landis, of Vineland, N. J., to be completed next fall.

Edgefield & Kentucky.

The County Court of Davidson County, Tenn., in which Nashville is situated, agreed, on the 10th inst., to subscribe $200,000 to the stock of the company organizing to purchase the Edgefield & Kentucky Railroad, and thus keep it in control of parties friendly to Nashville. It forms the southern outlet of the Evansville, Henderson & Nashville Railroad.

Worcester & Gardner.

The last rail was laid on this road, from Worcester, Mass., northward 23 miles to Gardner, on the 1st instant.

Charleston, Vincennes & Danville.

This company, which propose to construct a railroad from Charleston, Coles County, Ill. (11 miles east of Mattoon), northeast to Danville, about 55 miles, has received more than $400,000 in subscriptions from the country on the line, and, it is reported, is now ready to let the grading. It is hoped to have it completed next spring. It will serve as a feeder of the Chicago, Danville & Vincennes road. The directors are: R. M. Parcels, President; W. W. Fisher, Vice President; Messrs. J. W. Ogden, T. G. Chambers, Dr. J. Silverthorn, Z. Johnson and S. Sheppard, of Charleston, Ill.

Toronto, Grey & Bruce.

This company, whose road extends from Weston, nine miles west of Toronto on the Grand Trunk road, west by north to Orangeville, 38 miles, is nearly ready for the track to the village of Arthur, 24 miles further, and is to be completed to Mount Forest, seven miles northwest of Arthur, by the 1st of September. This road has a gauge of 3 feet 6 inches. One of the directors at the recent annual meeting said that the 62 miles to Arthur, only 15 of which were complete, with six engines and an insufficient stock of cars had cost about $15,000 per mile. The company has obtained the right to lay a third rail on the Grand Trunk between Weston and Toronto and use its track for a rental of $10,000 a year.

Morrison's Cove Railroad.

This is an extension of the Hollidaysburg Branch of the Pennsylvania Railroad. It is in operation eight miles, from Hollidaysburg to McKee's Gap, and 13 miles more, southward to a point near Martinsburg, is under contract. It will reach deposits of iron ore for which the Cambria Iron Works will furnish a market.

Philadelphia & Reading.

This company has declared a semi-annual dividend of 5 per cent., payable in cash on the 17th of July. The transfer books will remain closed until the 20th of July.

Lewisburg Center & Tyrone.

This road, which is to extend from Lewisburg, on the Philadephia & Erie road nine miles north of Sunbury, westward to Tyrone, on the Pennsylvania Railroad 14 miles northeast of Altoona, is to be completed this fall for twenty miles west of Lewisburg. Its total length will be about 75 miles.

Quincy, Missouri & Pacific.

The road-bed is to be completed soon from West Quincy to Kirksville, on the North Missouri, a distance of about 65 miles. Iron for this part of the road has been purchased, and is on the way from Europe.

Peoria & Rock Island.

The Peoria (Ill.) *Transcript* of the 8th says: "The last rail upon the Peoria & Rock Island Railway was laid about 6 o'clock last evening between Lafayette and Galva, thus completing the road from Peoria to Rock Island, and giving Peoria her seventh railway connection with the 'balance of mankind.' The first public meeting in the matter was held at Galva, December 20, 1866. At that meeting a committee was appointed to procure a charter for the road. This was done at the following session of the Legislature. A very active canvass on behalf of the road was made the following year, resulting in corporate and individual subscriptions to the stock of the company to the amount of some $40,000; when, on the 12th of November, 1867, the first meeting of the stockholders was held at Bureau Junction, and directors were chosen. The board organized by choosing Dr. Hamilton, President; O. E. Page, Vice-President, and V. Dewein, Secretary and Treasurer. The work of canvassing was renewed by the directors with renewed vigor. Surveys were made over several proposed routes, and the road finally located as at present built. Contracts for grading and bridging the road were let October 13, 1868, Prescott & Jameson being the successful bidders for the grading and masonry of the whole line, and L. G. Baum, of this city, for the bridges. Under the terms of the contract the grading was all to be done within twelve months. At that time the subscriptions to the stock of the company amounted to over $1,000,000, and an arrangement had been partially agreed upon for the Toledo, Peoria & Warsaw Company to iron and operate the road. This arrangement fell through, causing considerable delay in pushing the work. Subsequently an arrangement was made with Mr. P. L. Cable, by which his Coal Valley Railroad was consolidated with the company, and Mr. Cable undertook the equipment. This also fell through, and finally Ben Smith, of Columbus, O., took the job and has just finished the ironing as above stated. The rolling stock is also on the ground, and, so soon as the ballasting and necessary preliminaries for operating the road are concluded (which will be inside of thirty days), the Peoria & Rock Island Railway will become one of the institutions of Illinois."

This road extends from Peoria in a northwesterly direction, though not quite directly, to Rock Island, a distance of 90 miles. It crosses the Buda & Rushville Branch of the Chicago, Burlington & Quincy Railroad at Wyoming, the main line of the same road at Galva, and receives the Rockford, Rock Island & St. Louis at Orion, to which road it furnishes a track to Rock Island, 19 miles. It is supposed that this road will have close relations with the Pennsylvania Railroad, giving it a connection with Rock Island and Davenport, and with the Davenport & St. Paul Railroad, which it is encouraging By this line the distance from Rock Island to New York is 1,097 miles; by way of Chicago it is 1,093 miles.

Davenport & St. Paul.

The Davenport *Gazette*, of June 30, learns "that President Price has received a dispatch stating that 5,000 tons of railroad iron have been purchased for the Davenport & St. Paul Railroad, and that the shipping of it will commence immediately. This will lay about fifty miles of road, from the point to which the track has reached, which, we believe, is in the neighborhood of Allen's Grove, in this county, at least to Wyoming, in Jones County, if not to Monticello."

At a recent meeting of the directors Mr. Hiram Price, tendered his resignation as President. The resignation was accepted—with the condition that it be acceptable to Mr. Scott, Superintendent of the Construction Company—and the Executive Committee were authorized to appoint Col. J. H. Berryhill as his successor. Mr. Scott, however, has desired that no change be made, and Mr. Price remains President.

Louisiana & Missouri River.

The engineers are making a survey of a line from Fayette to Saline City, leaving Glasgow to the north. It is desirable to cross the Missouri below Glasgow in order to have a direct connection with the Missouri, Kansas & Texas road without the expense of two bridges.

Central of Long Island.

This railroad, an extension of the old Flushing Railroad, a little south of east to Farmingdale, near the southern coast, is progressing rapidly between Flushing and Rocky Hill, where there are heavy cuts, and is to be completed this year to Farmingdale.

St. Louis & Southeastern.

This company is having 50 cars built by the Missouri Car & Foundry Company, and 50 at Terre Haute. The Evansville Branch is now completed from Evansville westward to Mount Vernon, Ind., about 18 miles.

The ten miles between Mt. Vernon, Ind., and the Wabash River Bridge was to have been opened today.

North Missouri.

A committee recently appointed by the St. Louis City Council to investigate the affairs of the North Missouri Railroad reported to the council on the 10th inst. that, in its opinion, the second mortgage bonds issued by that company, and for the payment of interest on which the road is advertised to be sold next month, were illegally issued; that the increase of the stock of the company was also illegal, and that the Board of Directors is an illegal body. In view of these facts, the committee recommend that measures be immediately taken to protect the city's interest in the road, and to that end resolutions were adopted authorizing Mayor Brown to employ counsel for that purpose. The city and county each own $500,000 stock in this road, and another $1,000,000 is owned by citizens. The second mortgage bonds of this road amount to $4,000,000, and a sale of the road under foreclosure would sink all the original stock and about $2,000,000 of floating debt. The committee believe the road worth $20,000,000, and that there is no necessity for its sale.

Southeast Missouri.

A company with this name proposes to construct a railroad from an intersection with the Cairo & Fulton Railroad at St. Luke, in Stoddard County, Mo., through Dunklin County to the Arkansas line, about 45 miles. The capital stock is $1,000,000, and the following are the directors for the coming year: Otis N. Cutler, H. C. Pratt, Wm. Fullerton and Francis G. Saltons, all of New York; F. P. Blair, Jr., Dan Able and John A. Bowen, of St. Louis.

Cape Girardeau & State Line.

The *Southeast Reporter* of Bloomfield, Mo., says that this railroad is to be pushed with rapidity through Stoddard County. A large force is now engaged some five miles west of Lakeville, on this road, grading and clearing. Some 25 miles of the iron is already paid for, and more is under contract. How soon the company expect to complete the road to Indian Ford we are uninformed, but if the work continues being prosecuted in this style the road will soon be done.

Indianapolis & St. Louis.

Seeth & Hager, of Terre Haute, Ind., are building fifty freight cars for the Indianapolis & St. Louis Railroad.

New York & Oswego Midland.

The two great tunnels on the Midland Railroad in Sullivan County are nearly completed. At the Shawangunk Mountain Tunnel, only 600 feet intervene between the working parties. It is expected that it will be finished by December 1. The other tunnel, at Fallsburgh, will be completed in about a month.

The citizens of Piermont have been negotiating with the Erie R ilway Company, for some time, for a railroad from Upper Piermont or Orangeburgh to Rockland Lake, and eventually to Haverstraw by way of Long Cove; but, impatient of delay on the part of the Erie, they made overtures recently to the Midland Company, which were accepted, and engineers are making the preliminary survey. It is proposed to begin the branch at a point between Hackensack and Hackensack Junction, and run northerly through Schraalenberg, Tappantown, Orangeburgh and Clarkville, to Rockland Lake and Haverstraw.

A Missouri River Railroad.

Towns on the Missouri River are discussing the feasibility of a new railroad from St. Charles, westward through Augusta, Fulton, Columbia and Glasgow to Brunswick, not far from the north bank of the Missouri, and but a little distance south of the North Missouri Railroad.

Grand Tower & Iron Mountain.

Iron County, Missouri, is to decide by an election to be held on the 18th whether to subscribe $50,000 to this railroad.

Winona & St. Peter.

A contract is soon to be let for the extension of this road from St. Peter westward to New Ulm, about 25 miles, passing south of Swan Lake.

Chicago & Canada Southern.

Articles of consolidation of the Northwestern Ohio Railway Company and the Chicago & Canada Southern Railway Company have been filed with the Secretary of State of Indiana. The new name is the Chicago & Canada Southern Railway Company. The capital stock is placed at $3,000,000, divided in shares of $100.

Atchison & Nebraska.

This road has been, for some time, in operation from Atchison north, about 30 miles, to White Cloud, which is 2½ miles south of the Kansas and Nebraska State line. On the Fourth of July an excursion party with the first passenger train passed over the road north from White Cloud to Rulo, Nebraska, 10 miles, and to Falls City, 10 miles northwest from Rulo.

Fort Scott, New Chicago & Fredonia.

On the 26th of June, Messrs. John F. Courser & Co., of Wyoming County, New York, signed a contract to complete the road from New Chicago—on the Leavenworth, Lawrence & Galveston road—southwest about 25 miles, to Fredonia, by the 1st of November next. Ground was broken on the western end on the 27th ult.

Macon & Western.

The stockholders of this company met recently and instructed the directors to effect a lease of the road to the Central of Georgia, provided the decision of the Supreme Court should permit.

Toledo, Peoria & Warsaw.

The Burlington *Hawkeye* says: "The contracts for grading and bridging the La Harpe & Burlington Branch of the Toledo, Peoria & Warsaw Railroad were closed on the 4th inst. The bridging was taken by Craney & Mack. The grading for the first half of the line from La Harpe was let to Voltz & Morris, and the other half to Young & Campbell, of this city. The number of miles to be graded is twelve, the line forming a Junction with the Burlington & Quincy road eight miles from this city and one and a half miles north of Lomax Station."

Cincinnati, Richmond & Fort Wayne.

The following contracts for grading were awarded at Fort Wayne, June 27:

Sections 1, 3 and 8, McKee, O'Rourke & Kelly; section 2, Edward Ney; section 4, Robert Corson & Co.; section 5, John Corcoran; section 6, McKay & Goshorn; section 7, Charles Buck; section 9, Wm. T. Pratt.

Geneva & Southwestern.

A New York paper says: "Under this name a company has been incorporated in New York, whose object is to construct a railroad from Geneva, on the New York Central road, southwestward through the towns of Seneca, Gorham (or as near as practicable to the village of Bethel) to the village of Rushville, thence through the towns of Middlesex, Italy and Naples, *via* the village of Naples, to a point in the town of Cohocton, Steuben County, at or near Blood's Corners, on the Erie Railway, a distance of 38 miles. Amount of capital stock, $1,000,000."

European & North American.

The Boston *Advertiser* says the road is "ballasted to five miles above Mattawamkeag Point, while the tracklayers have advanced to within a half-mile of Kingman Village, and expected to reach the depot July 3, as sufficient iron had been carried up for that distance. A side track has been graded at Kingman, and most of the timber is ready for the depot buildings, which will be erected between the tracks some twenty rods down the river from the tannery and village. Above Kingman the road-bed will be ready for the iron as fast as sixteen men can lay the latter. The steam-shovel will soon be removed from Mattawamkeag to the extensive gravel-pit about a mile below Kingman."

Fort Scott & Allen County.

The Fort Scott *Monitor* says: "Work has now fairly begun on this road, and the entire road-bed between this place and Humboldt will be completed within the next four months. Steps have been taken to extend the road west of Humboldt towards the Arkansas River, on the line of the fifth parallel. There is no doubt but that this road will be completed west to a junction with the Atchison, Topeka & Santa Fe Railroad within eighteen months from date."

Missouri, Kansas & Texas.

The track was to have reached the Arkansas River this week. The rail is under contract as far south as the Canadian River, and the graders are at work south of the Arkansas River. The bridges being constructed across the Verdigris and Arkansas rivers are rapidly approaching completion.

St. Paul, Stillwater & Taylor's Falls.

This company has entered into contract with a construction company, composed mostly of citizens of St. Paul and Stillwater, to iron and equip the road to Stillwater and Hudson, and take the bonds of the railroad company in payment. The contract was signed on the 5th of July, and is for ballasting the track, and for a full equipment of rolling stock, freight, passenger, baggage and other cars, at an aggregate cost of a fraction less than $294,000, the whole to be completed by the first day of December next. A contract was also awarded on certain conditions to a new firm of Clark & Co., they being the lowest bidders, for the grading of the remaining portion of the road, the first five miles having been previously let to Nash & McCarty. Mr. I. S. Sewall, the Engineer of the road, has completed his survey and relocation of the line with the following results as to distances from St. Paul:

Distance to Stillwater	17 miles.
Distance to Hudson	18 miles.

The entire cost of the road is estimated at $500,000.

Northern Pacific.

The Minneapolis *Tribune* has information that "the track is now laid to Crow Wing River. Between this point and the crossing of Red River there remain but about 40 miles of grading to be done, and about one hundred miles of track-laying.

"The condition of the road from its junction with the Lake Superior & Mississippi road, west, is as favorable as could be expected. A large portion of the grading was done in the winter months, and here and there, at heavy marsh crossings, the road-bed has gone to the bottom. The running of through trains is, therefore, interrupted. The work of reballasting the defective places, and, where necessary, of piling them, is progressing, and but a short time will elapse before the road will be in a solid condition through the whole line."

PUBLISHER'S ANNOUNCEMENTS.

The Fidelity Safe Depository.

This new Chicago institution, in which individuals may rent, for a small sum, safes immeasurably better guarded than the best private safes can be, accessible to the lessee only, is conducted by a corporation whose members represent a capital of six or seven millions of dollars, and who are of the highest character for integrity. The plan is described on the last page of the present number of the GAZETTE.

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"So full of interesting matter that no railroad man, no matter how humble his position, should fail to take it."—*Seneca (Ks.) Courier.*

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